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Patent Pledges in The Automotive Industry

A multiple case-study on the reception and attitudes to patent pledges

Master's thesis in Intellectual Capital Management

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Abstract

Patent pledges can be defined as *voluntary commitments by a patent holder to limit the enforcement of their patents made to the public or at least to large segments of specific markets.* Recently, they have gained attention in relation to the Covid-19 pandemic, where several companies made such an initiative in a number of industries. While patent pledges have existed for more than 20 years, the concept has seen relatively little research. Specifically, no research exists which investigates the impact of pledges on a full industry, how they are received and perceived by actors in it, and what factors may influence adoption decision-making in different ways.

The purpose of this thesis is to investigate the concept of patent pledges within the context of the automotive industry. Specifically, it seeks to investigate the concept from the perspective of the pledgee (the receiving party) and assess how potential pledgees in the industry receive and perceive both the concept on a general level, and the pledges already existing in the industry. The project was designed as a multiple case study based upon three identified patent pledges in the automotive industry. The data was collected through semi-structured interviews with IP-professionals in the industry.

The study resulted in identifying several different characteristics and designs of current pledges in the industry, and some recommendations for future taxonomies of patent pledges. Specifically, the results indicate that the manner in which a pledge is adopted greatly differentiates the pledges from each other and how they are received. Three patent pledges with different pledge designs were identified, by Tesla, Ford and Toyota. The results indicate that successful pledges must achieve a suitable balance between simplicity and clarity which current pledges were not found to do. It was also found that actors in the automotive industry have a predominantly negative attitude towards both patent pledges in general and towards the existing pledges. Furthermore they do not think that the pledges have had an impact on the industry. The perceived motivations behind the pledges under study differed significantly from previous more general studies, trending towards motives which may be understood as less altruistic. The study also found that characteristics of the specific *Technology* as well as how the *Adoption* process works are the most important factors which actors assess in the adoption process. The results also suggest that some factors, such as *Pricing* and the *External Environment,* may be less important for such decisions than previous theory may indicate.

Table of Contents

Abbreviations and Definitions

EULA- End-User-License Agreement

EV - Electric Vehicle

HEV - Hybrid-Electric Vehicle

IP - Intellectual Property

IPR - Intellectual Property Right

OEM - Original Equipment Manufacturer

RQ - Research Question

SRQ - Sub-research Question

SDO - Standard Development Organization

TAM - Technology Adoption Model

TASC model - Technology Adoption in Supply Chains model

TTBER - Technology Transfer Block Exemption Regulation

WTP - Willingness To Pay

The *pledgor* is the actor which makes the patent pledge. They can be seen as the initiator and they have made a decision to create a patent pledge.

The *pledgee* is the actor which adopts a patent pledge. They utilize the patent pledge as formulated by the pledgor and have made an adoption decision.

List of models

Figures

Tables

Graphs

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"*No licensee has ever questioned the validity of a patent in a royalty-free license*"

- Bowman Heiden & Ruud Peters

"*Just as there is no free lunch, there is no free patent"*

- Liza Vertinsky

1. Introduction

1.1 Project Purpose

The purpose of this project in a wide sense is to investigate the concept of patent pledges within the context of the automotive industry. Specifically, it seeks to investigate the concept from the perspective of the pledgee (the receiving party) and assess how potential pledgees in the industry receive and perceive both the concept on a general level, and the pledges already existing in the industry.

1.2 Background

“*All our patent are belong to you”* was the title of a blog post in 2014 by prolific Tesla CEO Elon Musk in a reference to the poor English translation of the cult video game Zero Wing. The blog outlined Musk's view of patents as “*a lottery ticket to a lawsuit”* and that patents stifle innovation. The solution? Tesla would no longer sue for infringement of their patents if such infringement was done “in good faith” (Musk 2014). This statement garnered a lot of attention, and was criticized for its legal vagueness, particularly regarding what constituted “good faith”. Months later the blog post was complemented by a page on Tesla's website titled “The Pledge”, where Musk's statement was enclosed in more legalistic terms which further defined under what circumstances Tesla would abstain from infringement suits (Tesla 2015).

The concept of a public “vow” or “pledge” to not bring action for patent infringement, commonly called a “patent pledge”, is not a new one. Companies that have released Open Source Software have made similar pledges in relation to utilization of patents for Open Source development since the late 1990s. In 2005 IBM publicly stated that they would not sue for infringement of their patents done for educational or health care purposes (Contreras 2018). Companies including Nokia, Sony and DuPont jointly made similar statements in the late 2000s within the frame of the “EcoPatent Commons” initiative regarding utilization of their patents for “green” purposes (Contreras et al. 2019). It has seen increasing utilization in numerous industries, including ICT and the automotive industry (Contreras 2018). The initial automotive pledge by Tesla in 2014 was soon followed by Ford (2015) and Toyota (2015) who later extended the scope of their pledge (2019). These patent pledges differ from one

another in how they are constructed, and several different definitions and taxonomies exist (See e.g. Contreras 2015, Ehrnsperger 2021).

The question of what motivates patent owners to make such pledges and "open" their patents invites discussion, as exclusivity is the basic assumption of the patent system. Scholars in the field commonly describe the motive for such pledges in terms of increasing technology diffusion (i.e. spreading innovation), no matter the underlying motives (Ehrnsperger 2021). If a company has altruistic motives in spreading "green" technologies, increasing technology diffusion seems the natural goal. In less altruistic terms, value creation can be understood as an increase in network effects, growing the market and technology market share (Ehrnsperger 2021, see also Shapiro & Varian 1999).

In the automotive industry, the pledges relate to electrification and other new technologies. The automotive industry as a whole is in a transformation process toward electrification and connectivity. The process of converging technologies and changes to the traditional automotive value offering is sometimes dubbed "CASE" (Connected, Autonomous, Shared, Electric) (Ehlers 2018). Historically, the automotive industry has been characterized by a "patent détente", where patent litigations between major actors are rare even in cases of clear infringement. The presence of new technologies and actors are changing this (Patel 2021). The newly converged industries and companies therein are not part of the automotive patent peace, and the détente may be approaching its end.

1.3 Problem Statement

Patent pledges are becoming more common. Recently, the Open Covid Pledge was signed by several of the largest companies in the world to share patents to combat the pandemic. The motivation to make such a pledge as well as their efficiency from a theoretical perspective has previously been researched by several authors (see e.g. Contreras et al. 2019, Ehrnsperger 2021, de Rassenfosse & Palangkaraya 2023). What is however less known is how such pledges are received and perceived by potential pledgees as well as how they impact industries as a whole. It is unknown what factors and pledge design make actors more or less inclined to adopt and use a patent pledge. In order for technology companies to know when a patent pledge may be a suitable IP strategy, these questions must be further investigated.

The automotive industry has been subject to three patent pledges with different characteristics for almost ten years at the current date. This makes the automotive industry suitable for a study on the topic.

1.4 Research Questions

The main research question represents the project and purpose as a whole, with sub-questions being designed to support and help answer the main research question.

MRQ: *How are patent pledges received and used by companies in the automotive industry?*

SRQ 1: *What characterizes the patent pledges used in the automotive industry?*
Sub-question 1 aims to identify what patent pledges exist in the automotive industry and assess them in relation to existing theories, taxonomies and characteristics. It also aims to understand whether existing theory aptly captures the complexity of the specific pledges in the industry.

SRQ 2: *What are the perceptions of: patent pledges, their impact, and the motivations behind them, among actors in the automotive industry?*
Sub-question 2 assesses attitudes toward patent pledges by actors in the industry, both on a conceptual level and in relation to the specific pledges in the industry. It also explores what impact the pledges have had according to these actors. Lastly it aims to investigate how the motives of patent pledges in the industry are perceived and how that compares with previous non-industry specific studies on the topic.

SRQ 3: *How do various characteristics of a patent pledge and other factors influence the decision-making of actors in the automotive industry regarding the adoption of pledges?*
Sub-question 3 aims to assess what factors influence pledge adoption in what ways. It also seeks to identify and quantify which factors are most important to potential pledge recipients in the industry.

1.5 Delimitations

The project will not focus on everything that could potentially be called a patent pledge by different scholars, but will be limited to investigating unilateral pledges outside of standards development organizations in line with Contreras definition (Contreras 2015).

The organizations selected for interviews will only feature OEMs and Tier 1 Suppliers in the automotive industry. This is partially because of an initial assessment of those being the primary targets of existing pledges, and partially due to their stronger ties directly to the automotive industry as such, whereas Tier 2 suppliers and beyond often supply several industries.

Certain factors from theory were not assessed due to time limitation of the interviews. Explanation for the selection of factors will be provided in section 3.3.2.

The project will also not focus on questions of legal nature such as the enforceability of patent pledges, concepts such as this will merely be utilized in interviews for questions relating to if legal uncertainty may impact pledge adoption.

1.6 Disposition

Following this introduction, the thesis has 7 chapters:

Chapter 2 *provides background and theory to the concept of patent pledges and technology diffusion which are utilized in the research.*

Chapter 3 *explains the methodology of how the study was conducted.*

Chapter 4 *provides the results and analysis of SRQ 1 regarding characteristics of patent pledges in the automotive industry.*

Chapter 5 *provides the results and analysis of SRQ 2 regarding various perceptions of patent pledges by actors in the automotive industry.*

Chapter 6 *provides the results and analysis of SRQ 3 regarding the factors which impact adoption of patent pledges in the automotive industry.*

Chapter 7 *contains a consolidated analysis of all the results together*

Chapter 8 *summarizes the conclusions drawn from both the results and analysis of the study and bookmarks the project.*

2. Theoretical framework

Chapter 2 provides different theoretical frameworks that are relevant for answering the research questions. *Section 2.1* includes: what a patent pledge is, taxonomies of different pledges, and how patent pledges should be constructed to be effective according to theory. *Section 2.2* describes open innovation as the context where patent pledges emerged, what motives for making patent pledges have previously been identified, and specifically focuses on technology diffusion and network effects as two of those motives.

It is also suitable to firmly clarify some terminology which will be utilized extensively throughout the thesis in order to remove any confusion.
The *pledgor* is the actor which makes the patent pledge. They can be seen as the initiator and they have made a decision to create a patent pledge.
The *pledgee* is the actor which adopts a patent pledge. They utilize the patent pledge as formulated by the pledgor and have made an adoption decision.
This mirrors the more common dichotomy of licensor - licensee.

2.1 Patent Pledges - What is the fuss about?

To understand what patent pledges are on a theoretical level, it is helpful to look at how they have been defined by different authors. Schultz and Urban defined patent pledges as: "*promises by patent holders not to enforce their patents under certain conditions*" (Schultz & Urban 2012, p. 30). Contreras defined it in a similar way: "*commitments made voluntarily by patent holders to limit the enforcement or other exploitation of their patents*". He also added that they are: "*made not to direct contractual counterparties, but to the public at large, or at least to large segments of certain markets*" and: "*made without any direct compensation or other consideration*" (Contreras 2015, p. 546). It should be noted here that Contreras does not mean that all patent pledges are made free as in *gratis*. Rather, Contreras means that the pledgor has not received any compensation for *making the pledge creation decision*. As such, the pledge can require monetary compensation, but the creation of the initiative in itself is not compensated by a third party.

Asay (2016), referring to Contreras (2015), summarized patent pledges as: "*a phenomenon where parties voluntarily commit to limit enforcement of their patent rights*". Ehrnsperger

developed a more extensive definition connected to his developed taxonomy of patent pledges: "*A patent pledge is a publicly announced intervention by patent owning entities ('pledgors') to out-license active patents to the restricted or unrestricted public free from or bound to certain conditions for a reasonable or no monetary compensation*" (Ehrnsperger 2021, p. 86).

Ehrnsperger's definition is clearly the most comprehensive. To a large extent it summarizes and systematizes the previous definitions of the term. It covers a variety of patent pledges, directed to everyone or a restricted group, with or without conditions, with or without an associated compensation. Ehrnsperger's definition differs from the previous definitions of the phenomenon in using the word "out-license" instead of "limit enforcement" or something equivalent. He motivates this with the reasoning that his research looks at patent pledges from a managerial perspective, and that patent pledges are referred to as licenses to keep a consistent terminology. In practice, this difference in wording has a limited effect. As a patent is the right to exclude others from making use of an invention in different ways, licensing out a patent essentially means limiting the enforcement of the patent right in relation to the licensee(s) (Runesson 2014, p. 33).

2.1.1 Taxonomies of Patent Pledges

A couple of authors have attempted to create taxonomies to distinguish between different types of patent pledges. Contreras argued that non-SDO patent pledge commitments fall into three general categories: "*Primary Access Commitments", "Secondary Royalty Commitments",* and "*Non-royalty Commitments"*. These commitments are not mutually exclusive, meaning that any given patent pledge may contain several different patent pledge commitments (Contreras 2015).

The **Primary Access Commitment** is defined as: *"a broad statement indicating the nature of the access that the patent holder wishes to give the public to its patent"* (Contreras 2015, p. 558). This includes three options according to Contreras. The first is making the patents available to specified groups of parties by promising not to assert the patents against these groups. Contreras provided the examples of small businesses, and manufacturers of products complying with a standard. The second is licensing the patents on fair, reasonable, and

non-discriminatory (FRAND) terms. The third is licensing the patent without royalty (Contreras 2015).

Contreras explained **Secondary Royalty Commitments** as: *"additional commitments regarding the royalty rates that they* [firms] *will charge for standards-essential patents"* (Contreras 2015, p. 559). By this, he primarily meant specifying what constitutes FRAND terms, as that can sometimes be disputed. *Secondary Royalty Commitments* are thus add-ons to *Primary Access Commitments* in this framework. This includes "*Maximum Royalties"* and "*Royalty Calculations"* (a specified way of calculating royalties) (Contreras 2015).

Non-royalty Commitments are defined as pledges which: *"limit the patent holder's ability to enforce and otherwise maximize rents from its patents, but in ways that are not directly tied to licensing royalties"* (Contreras 2015, p. 563). Contreras gave two examples of this kind of commitments: "*No Injunctions"*, and *"No NPE Transfers"*. "*No Injunctions"* refers to the commitment not to seek an injunction which would prevent the use of standardized technology as to which they have made FRAND commitments. *"No NPE Transfers"* refers to the commitment not to transfer patents to non-practicing entities (pejoratively called "patent trolls") (Contreras 2015).

Ehrnsperger quoted Doty and Glick (1994) to provide a definition of what taxonomies are: *"classification systems that categorise phenomena into mutually exclusive and exhaustive sets with a series of discrete decision rules"* (Ehrnsperger 2021). Based on this definition, Ehrnsperger argued that Contreras' framework should not be labeled a taxonomy, as his categories are not mutually exclusive. Instead, Ehrnsperger argued, Contreras' work could be viewed as an 'insightful precursor' of a patent pledge taxonomy.

By reviewing the content of 48 patent pledge statements, Ehrnsperger developed a new patent pledge taxonomy (Ehrnsperger 2021). From the data set, he extracted 12 first order concepts, which led to six second order concepts, which finally were grouped together in three final, mutually exclusive, dimensions. These three dimensions are: *"Accessibility", "Compensation",* and *"Conditions"*. Together they form a 3-dimensional taxonomy which Ehrnsperger describes as comprehensive and expandible.

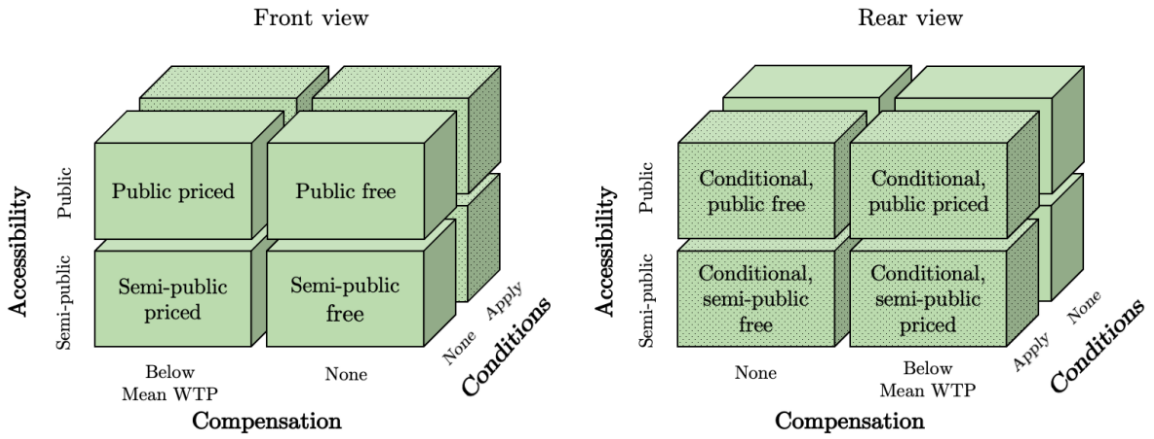


Figure 1. *Illustration of the taxonomy created by Ehrnsperger (2021).*

Ehrnsperger defined the dimension **Accessibility** as the: *"potential recipients of the pledged patents"* (Ehrnsperger 2021, p. 69). This dimension includes the mutually exclusive values *"Public"* and *"Semi-Public"*. A patent pledge which is *"Public"* allows anyone to make use of it, while a patent pledge which is *"semi-public"* allows a defined group of the public to make use of it, e.g. automakers (Ehrnsperger 2021). This relates to Contreras wording of pledges being "*made to the public, or at least to large segments of certain markets"* (Contreras 2015).

The dimension **Compensation** is defined by Ehrnsperger as *"the monetary price that must be paid to make use of the patent pledge"* (Ehrnsperger 2021, p. 70). The mutually exclusive values in this dimension are *"None" or "Below mean WTP"*. A patent pledge which has the value *"None"* in the Compensation dimension makes patents available for free, while a patent pledge which has the value *"Below mean WTP"* in the Compensation dimension makes patents available for a reasonable royalty rate, defined as below the average willingness to pay among several parties (Ehrnsperger 2021). It can thus be noted that Ehrnsperger accounts only for direct transaction costs such as royalties, and not indirect costs such as learning costs.

Ehrnsperger defined the dimension **Conditions** as: *"any restrictions that the a priori defined parties that are allowed to make use of the patent pledge need to honour"* (Ehrnsperger 2021, p. 70). The mutually exclusive values in this dimension include *"None"* and *"Apply"*. The value *Apply* means that the patent pledge is subject to at least one condition. This value is divided into *"Direct conditions"* (restricted utilization in space or time) and *"Indirect*

conditions" (actions for the pledgees to take or refrain from). These conditions have been further classified in two types of direct conditions, and three types of indirect conditions. The Direct Conditions' identified by Ehrnsperger are: *"Limitation to specific applications and/or territory"*, and *"Limited duration"*. The Indirect Conditions identified by Ehrnsperger are: *"Non-assertion clause"*, *"Subject to reciprocity/ grant-back license"*, and *"Written agreement to abide by the patent pledge"*. These conditions are not mutually exclusive, and can be found in different combinations (Ehrnsperger 2021).

When classifying patent pledges according to Ehrnsperger's taxonomy, all patent pledges will take a value in each dimension. For example, a patent pledge which in the dimension Conditions has the value *"Apply"*, in the dimension Accessibility has the value *"Public"*, and in the dimension Compensation has the value *"Below mean WTP"* will be classified as a *conditional, public priced* patent pledge. As the number of total combinations is eight, it means that Ehrnsperger's taxonomy in total describes eight different patent pledge types (Ehrnsperger 2021).

Accessibility		**Compensation**		**Conditions**		
Public	*Semi-public*	*None*	*Below mean WTP*	*None*	*Apply*	**Classification**
X		X		X		Non-conditional, public free
X		X			X	Conditional, public free
X			X	X		Non-conditional, public priced
X			X		X	Conditional, public priced
	X	X		X		Non-conditional, semi-public free
	X	X			X	Conditional, semi-public free
	X		X	X		Non-conditional, semi-public, priced
	X		X		X	Conditional, semi-public priced

Table 1. *Adapted version of the taxonomy created by Ehrnsperger (2021).*

It is worth noting that Ehrnsperger's taxonomy is focused on the *pledge document* in itself. As such, pledges in the same category taxonomically may differ significantly in practice, and be more similar to other categories. An example of this is the Ford pledge, which would be placed taxonomically in the *semi-public, below mean WTP, non-conditional* category. In practice however, it is possible that certain conditions do apply regarding utilization, since the pledge requires interested parties to contact Ford in order to get access to the patents. The reason it is placed in its position in the taxonomy is due to the pledge as a document not explicitly stating any conditions.

Related to this issue, Valz notes a difference between two different kinds of patent pledges (Valz 2017). One kind offers FRAND terms for licensing pledged patents. An interested party needs to contact the patent holder and negotiate the terms. That means that the patent pledge itself does not set forth all conditions, which in turn means that it is often very short. It is simply a "*promise to enter into a contractual license agreement*" (Valz 2017, p. 38). The other kind of patent pledge offers rights immediately. This means that no contact needs to take place between the patent holder and the party interested in using the patents. That in turn has the consequence that this kind of pledge is usually much longer, as all conditions are stated in the pledge itself. This is a clear difference between two different kinds of patent pledges not accounted for by Ehrnsperger's taxonomy.

2.1.2 Making Patent Pledges Effective - Best Practices

Vu (2016) and Jacob (2017) are two authors that have attempted to describe what makes a patent pledge effective. Vu did this by identifying elements of a successful patent pledge, based on a comparison with open-source licenses in the copyright sphere. Jacob did it by recommending best practices for making patent pledges, based on what would create legal predictability and make the public rely on the pledge. Contreras (2021) did something similar when he identified design principles for creating the Open COVID Pledge. While these design principles were identified in relation to one pledge with a specific purpose, the design principles that built on legal enforceability and broad use of pledged patents are applicable on a broader scale.

Vu recommended companies to make two versions of an individual pledge, one easily understood by lay people, and one more extensive which would lay out the conditions of the pledge and could be tried in court (Vu 2016). There is no equivalent "best practice" in Jacob's article (Jacob 2017). Vu's suggestion can be problematized, as potential discrepancies between the two versions could be a source of conflict, and create more problems than it solves. An alternative solution could be Contreras' design principle of simplicity, which was intended to create a legal structure that was simple, intuitive, and understandable to non-lawyers (Contreras 2021).

Another recommendation by Vu is to make the patent pledge as specific as possible, for example by defining ambiguous terms and addressing common scenarios (e.g. bankruptcy) (Vu 2016). Specificity was also recommended by Jacob, who made remarks about the importance for the patent holder to define ambiguous terms, clarify what kind of commitment that they are making and identify exceptions to the pledge (Jacob 2017). Another way to make a patent pledge more specific according to Vu is to specify whether, and under what conditions, the third-party user may patent inventions that utilize the pledged patents (Vu 2016). Jacob's suggestions to identify the patents by patent number and field of art is also part of making the patent pledge more specific (Jacob 2017).

Vu also identified the attachment as an element of a successful patent pledge. An attachment element means some kind of registration system, where a third-party user would register their use of a particular patent covered by the make. This would make it easier for other potential users to know that a patent is part of the pledge, and could enable an easier search process for pledged patents. With a starting date for when the third-party started to use the patent, it would also be easier for them to prove in court that they were using a legitimate pledged patent (Vu 2016). This can be compared with Jacob's similar suggestions of making pledges findable by posting them in a topical and permanent section of a website, documenting dates when the pledge was made or modified, and making the text of the pledge searchable (Jacob 2017). It can also be contrasted with Contreras' principle of self-execution, which was meant to avoid administrative steps in order to minimize barriers to adoption (Contreras 2021).

Jacob added a number of other suggestions for best practices, namely a promise to condition future transfers of patents on continuation of the pledge, explicitly making the pledge irrevocable, and providing a notice of whether the patent owner has transferred any patents

covered by a pledge in the past (2017). To allow the use of patents without charge was mentioned by Contreras as a design principle to make a patent pledge publicly beneficial. Contreras also mentioned uniformity and limited scope as design principles for the Open COVID Pledge, but they are not deemed to be as applicable on a larger scale as they are constructed specifically to encourage patent owners to participate in the pledge (Contreras 2021).

2.2 Motives and Background for Patent Pledges

As has been illustrated in the previous chapter, it is obvious that patent pledges are a business conduct which comes in many shapes and exists in a wide range of industries. The motivation for such a conduct is however an area of research in itself due to a seeming contradiction. The most basic assumption of patent law is that a patent gives its owner an exclusive right to the patented technology (Granstrand 1999, p. 56). The pledge by its very nature derogates from this basic assumption, and seemingly removes the very function of patents in the legally granted exclusivity. It is therefore natural that the question of what motivates patent owners to give up this exclusive right, for a low or no monetary compensation, arises.

To investigate this, it is necessary to assess the context and background from which patent pledges stem.

2.2.1 Open Innovation - Contextualizing patent pledges

Patent pledges have been understood as being related to the open innovation-movement, which emerged in the early 2000s (Maggiolino & Montagnani 2017). Traditional industrial innovation creates value through internally developing products or knowledge which is then leveraged outside the firm. Open innovation as a concept flips this notion on its head. Chesbrough defines Open innovation as "*...the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively*". Put differently, it is the presupposition that both internal and external ideas and leverage options can and should be utilized by firms to create value (Chesbrough et al. 2008). In relation to more traditional organizational structures, it could be said that openness relates to both inbound and outbound logistics in Porter's value chain (Porter 2001, p. 53). Patent pledges as a concept belong to the regime of open innovation as it relates to a manner of sharing development of internal resources as well as often involving an

element of gaining access to external ones. Patent pledges as such represent not only a business conduct on its own, but is rather part of a larger movement in which it is argued that exclusive utilization of intellectual resources is not the most productive nor the least costly methodology.

According to Chesbrough the evolution of these concepts are due to economic pressures on innovation activities in the form of: I) *Shorter product life in the market* and II) *Rising costs of innovation overall as technology gets more complicated* (Chesbrough 2007). Through utilizing external resources in both inbound and outbound logistics, these methods serve to cut costs in production and distribution (Boudreau 2010). Furthermore, the technological advancement of the modern age and the convergence of technologies, such as ICT into the automotive market, increasingly makes it more difficult for one firm to possess prime competencies in all areas, thus potentially increasing outbound product quality by utilizing open approaches (Chesbrough 2007).

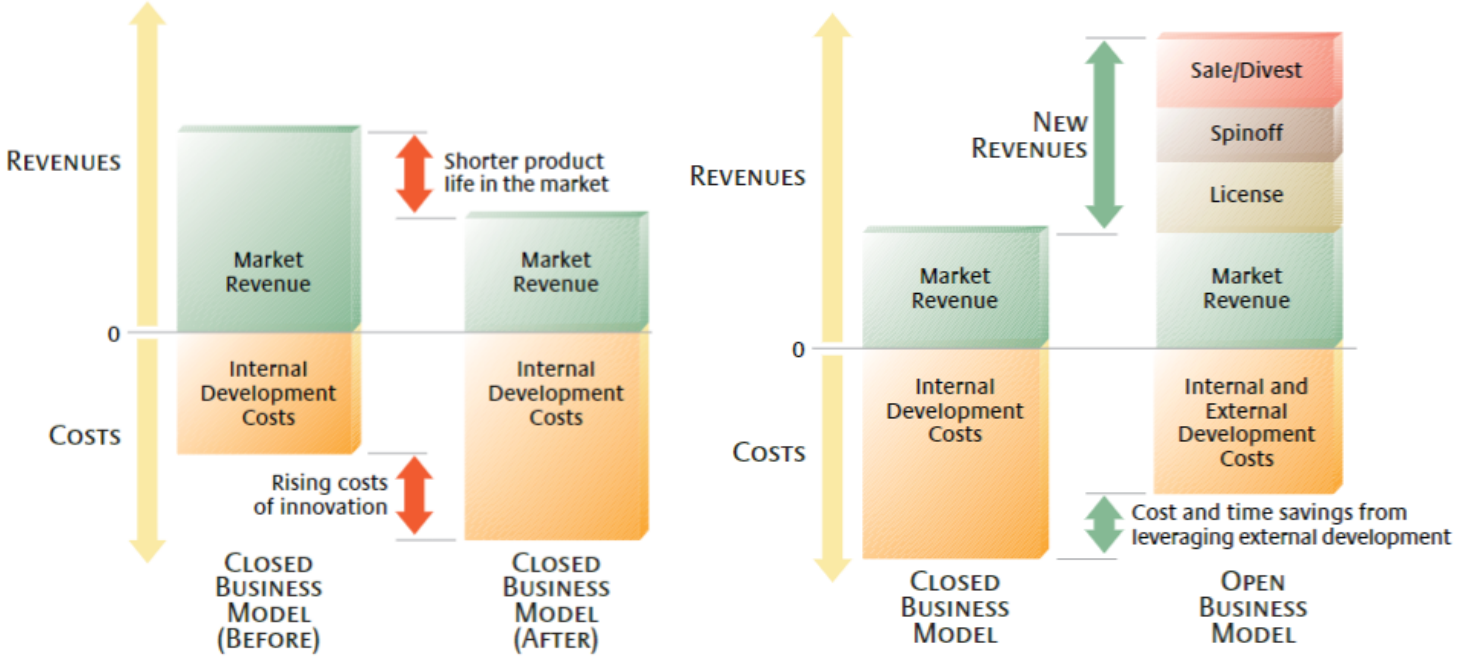


Figure 2: *The Economic Pressures on Innovation* (L) and *The New Business Model of Open Innovation* (R) from Chesbrough (2007).

Examples of structures of open innovation traditionally include, for instance, so-called Patent Pools and Open Source Software. A *patent pool* is generally understood as a commitment by two or more patent holders to aggregate their patents to jointly cross-license them (Lampe & Moser 2016). Open Source Software can be defined as distributing software with access to

the source code and allowing modification and free redistribution by licensees (St. Laurent 2008). In both cases the right holders of the intellectual property in question thus waive enforcement of some of their exclusive rights associated with their intellectual property. Utilization of open innovation strategies thus inevitably entails a loss of control to a certain extent (Boudreau 2010). Alexy defines this voluntary forfeit of control over resources as *strategic openness* (Alexy et al. 2018).

Alexy argues that strategic openness can create more value than merely that which is modeled in figure 2 (Alexy et al. 2018). This value is tied to *complementarity.* Katz & Shapiro define complementary resources as systems of two or more components with interfaces which allow the components to work together (Katz & Shapiro 1994). An example given of strong complementarity is a music player and a record, which hold marginal value without the presence of the other.

Through a "*bundle based level of analysis of resources*", Alexy argues that firms can thus create value through open initiatives by maintaining control of part of a complementary system (Alexy et al. 2018). Furthermore, he suggests that firm performance may be increased in high competition environments when opening resources due to superior knowledge regarding a resource, meaning that firms which open resources are able to leverage on improvements more efficiently while reducing performance of rivals who may produce that resource as their main business. "*The focal firm thinks of it as a potential commodity, its rivals consider it important"* (Alexy et al. 2018).

2.2.2 Motives for Pledging Patents - Altruism or Business Strategy?

Patent pledges as such can be assumed to be motivated by the overall movement of open innovation. Several authors have however investigated the primary motives for patent pledges specifically, beyond the groundwork defined by the theories of open innovation. Ziegler et al. (2014) asked the question why firms give away their patents for free. The authors did not focus only on patent pledges, but also on related phenomena such as patent donation and free licenses. Based on findings from literature and case studies, the authors identified four main motives for this kind of behavior: "*profit making", "cost cutting", "innovation catalysing",* and *"technology providing"*.

The authors identified *Profit making* as a motivation primarily in the software industry. By making core patents available through free licenses, these firms intended to improve their product through benefiting from community activities. *Cost cutting* refers to the motivation to reduce maintenance fees and achieve tax reductions, and was accomplished by donating non-core patents to research institutions (e.g. universities), and non-profit organizations. *Innovation catalysing* also occurred through non-core patent donation to these kinds of institutions and organizations, but instead of having a direct monetary reason, firms with this motive intended to strengthen research networks and trigger innovation activities. Firms with *Technology providing* motivations intended to access third party patents through patent pools, generating good will, and serving society (Ziegler et al. (2014). This was accomplished by making core patents available to third parties through free licenses and patent pledges.

Contreras was the first author to systematically explore the motives specifically for patent pledges. Based on catalogs of SDO (standards development organizations) commitments, and his own public database of other patent pledges, the author provided four fundamental categories of patent pledge motives: *"Inducement"*, *"Collective Action"*, *"Voluntary Restraint"*, and *"Philanthropy"*. These categories relate to pledgors' motives for making pledges, and the intended effect on other market actors (Contreras 2015).

Inducement is defined by Contreras as a patent pledge which *"lowers patent barriers to induce market participants to adopt a particular standard or technology platform that is favored by the pledgor"* (Contreras 2015, p. 548). According to Contreras, inducement pledges have three sub-categories: *"Interoperability"*, *"Platform Leadership"*, and *"Market Development"*. *"Interoperability"* refers to making devices manufactured by different firms compatible with one another (e.g. USB, Wi-Fi and 3G/4G), and has been promoted by pledges both inside and outside SDOs. *"Platform Leadership"* is defined as a proprietary platform owner making patents available for developers of related products and services, to induce the market to adopt their platform. *"Market Development"* pledges are seeking to promote the adoption of a broad category of technology, generally where the pledgor is a leader.

A patent pledge motivated by **Collective Action** *"advances the achievement of a collective goal that is beneficial to the pledgor"* according to Contreras' definition (Contreras 2015, p. 548). These kinds of pledges have been made for example in the environmental arena (e.g.

Eco-Patent Commons) and the area of patent litigation (e.g. non-NPE transfer pledges). Collective Action pledges can be coordinated and depend on the participation of multiple parties, but can also be made on the initiative of a single actor aiming to induce similar behavior by other firms (Contreras 2015).

Voluntary Restraint is the category of patent pledges that: *"restrains the pledgor's ability to assert its patents, often addressing concerns of governmental authorities"* (Contreras 2015, p. 548). This is generally made to reduce fear among other actors, particularly governmental authorities, that the pledgor exerts its patents in an undesirable way. Often, this kind of pledge relates to convincing antitrust and competition enforcement agencies to make a favorable decision, but they can also be made to show a court that the pledgor is not aggressively enforcing its patents. FRAND commitments can be viewed as this kind of patent pledge, but there are also examples of individual companies who have made it to influence specific decisions (Contreras 2015).

Philanthropic patent pledges are defined by the author as pledges that *"advances a social cause or other public good with concomitant public relations benefits to the pledgor"*. Contreras notes however, that even these kinds of pledges are motivated by several different factors, not many of which are purely philanthropic. Firstly, because pledgors benefit themselves from the pledges' effects, e.g. through green technology leading to a healthier population and environment. Secondly, because Philanthropic pledges can have public relations benefits. Contreras also comments that pledges which primarily fall into one of the other categories are sometimes framed as being Philanthropic for the sake of PR benefits, and gives examples of this from all the other three categories (Contreras 2015).

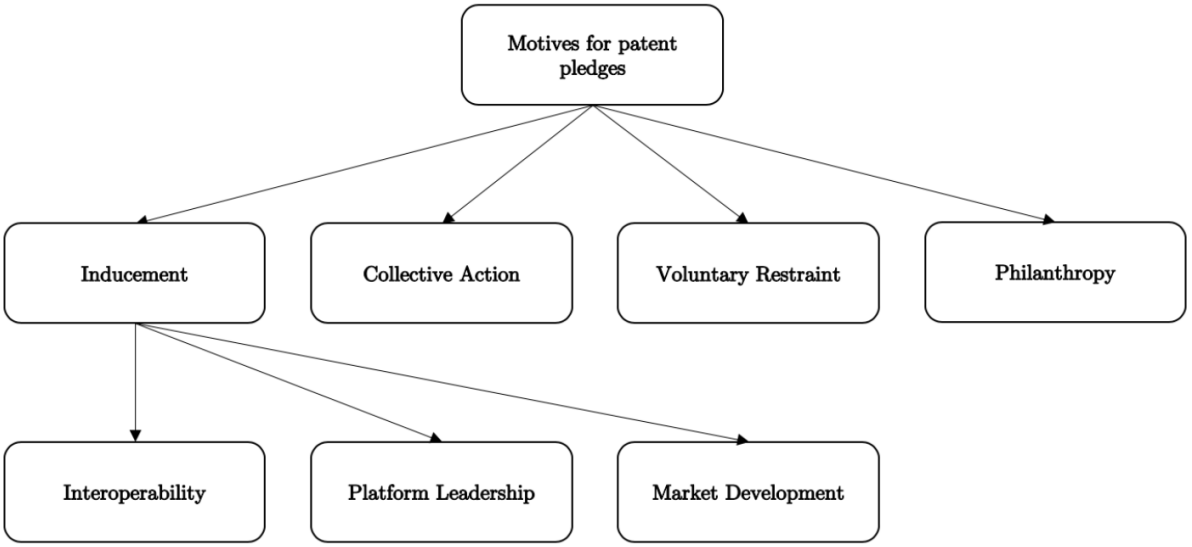


Figure 3. *Illustration by Ehrnsperger (2021) of Contreras' categories of motives for patent pledges.*

When summarizing the literature in the field, Ehrnsperger concluded that there was a need for *"a study that builds upon and extends the insights of Contreras"* (Ehrnsperger 2021, p. 25). In Study 2 of his doctoral thesis, Ehrnsperger attempted to undertake such a study. After conducting 22 semi-structured interviews with IP-experts from 16 distinct organizations, and collecting secondary data from 60 publicly available patent pledge statements, he collected 13 motives through qualitative coding. These 13 motives were clustered into three categories: *"economic motives"* (five), *"perceptional motives"* (six), and *"technological motives"* (two) (Ehrnsperger 2021).

Economic motives are defined by Ehrnsperger as relating to "*the prospect of direct or indirect monetary rewards through the engagement of other firms"* (Ehrnsperger 2021, p. 93). The five different economic motives are summarized below. "*(1) Driving technology diffusion and ecosystem and infrastructure growth"*, is the most prominent of all motives according to Ehrnsperger's findings, as it was mentioned by 80% of the pledging interviewees. It relates to the pledgor's intention to increase the adoption rates of specific technologies or technology areas. More on this topic will be explained in section 2.2.3. To *"(2) Foster collaboration, open innovation and resource pooling"* has to do with creating new collaboration opportunities, and strengthening existing collaborations. The motive to *"(3) Foster network effects and economies of scale"* is similar to the first economic motive, but focuses more on the learning effects that other companies' utilization of the pledged patents has on the pledgor. More on this topic will be explained in section 2.2.4. *"(4) Promoting additional*

monetization" refers to simply generating revenues through licensing, which means that this motive is only relevant for pledges where there is compensation involved. Lastly, the motive of *"(5) Encouraging competition"* appears similar to motive (1) and (3), but was treated as a separate motive by Ehrnsperger to avoid premature conclusions as this motive was only found in the texts of patent pledges, and not mentioned by any of the interviewees (Ehrnsperger 2021).

Perceptional motives *"relate to the potential benefits through the improvement of a patent owner's reputation, as well as through the reduced uncertainty and patent threats of a technology"*, according to Ehrnsperger (Ehrnsperger 2021, p. 94). The motive to *"(1) Decrease uncertainty and patent threats"* was the second most common one of all motives, as it was mentioned by 47% of the pledging interviewees. This motive should be understood as the aim to create an IP environment which is not characterized by conflict, skepticism, and lack of transparency (Ehrnsperger 2021). *"(2) Building reputation and PR"* was also mentioned by relatively many interviewees (40 %), but not in any of the pledges themselves. This motive relates to intentions to gain different kinds of reputational benefits for the pledgor. *"(3) Showing social responsibility"* is when a pledgor not only intends to build a reputation for themselves, but to address the public in a way that could benefit the whole community. The motive of *"(4) Attracting attention and providing clarification"* is similar to building PR, but more focused on attention grabbing and clarifying that the pledgor is not a "patent troll". *"(5) Fostering sustainability"* relates to pledges aiming to achieve sustainable practices and environmental benefits. Lastly, *"(6) Fostering integrity"*, was treated as a separate motive as it was only mentioned in the text of patent pledges, and as it could not be confirmed that it was identical to any of the other motives.

Technological motives are related to *"the improvement of a technology and its interoperability with other technologies"* (Ehrnsperger 2021, p. 96). Ehrnsperger presents two technological motives, which are summarized below. *"(1) Improving and fostering technology and innovation"* is different from technology diffusion in that the goal is improvement of technology, not necessarily diffusion of the same. *"(2) Standard setting and fostering interoperability"* relates to establishment of industry standards and compatibility between technologies (Ehrnsperger 2021).

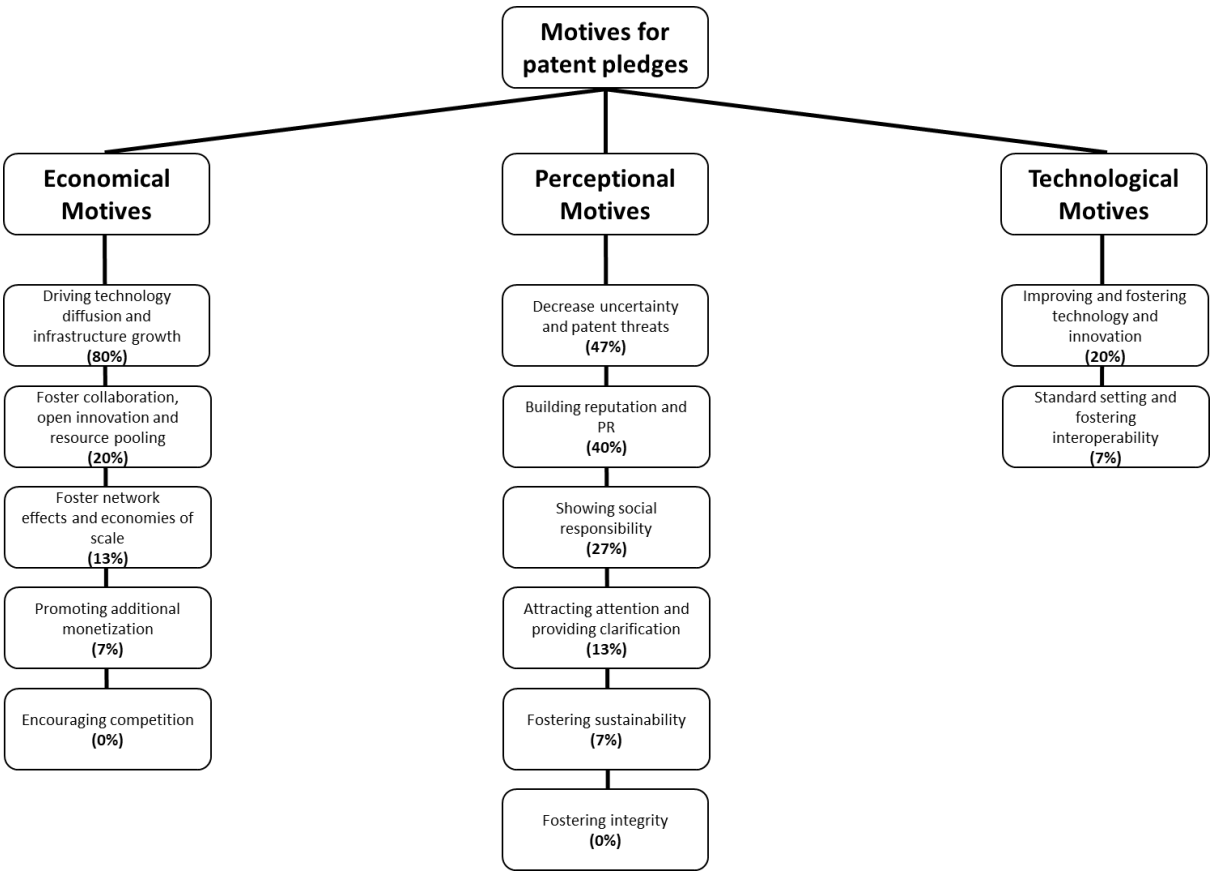


Figure 4. *Adapted illustration of the patent pledge motives categorized by Ehrnsperger (2021) with occurrence rate in interviews expressed in % in brackets.*

Technology diffusion is the most prominent of all motives according to Ehrnsperger's study, and is the topic of the next section.

2.2.3 Technology Diffusion - How technology spreads

Ehrnsperger's theories above indicate that patent pledges have a strong connection to the concept of technology diffusion. This connection is also made by several other authors (see e.g. de Rassenfosse & Palangkaraya 2023, Contreras et al. 2019, Wen et al. 2016). If a patent pledge is to be seen as a functional IP-strategy tool, this connection must be accepted. If the sole motive is building PR, it must be viewed not as an IP-strategy, but a PR-strategy. As such, the definition of *impact* and *efficiency* of patent pledges in this thesis are based on the ability of patent pledges to boost technology diffusion. In order to investigate adoption, factors which impact technology diffusion in general are interesting to assess.

How technology spreads and is adopted is an area of a lot of interest and research from academics and practitioners alike (Rogers 1962). The process of technology spread is often called technology/innovation diffusion. Rogers defines technology diffusion as "*the process in which an innovation is communicated through certain channels over time among the members of a social system"* (Rogers 1962). As such, the process of spreading technology is a communicative game wherein information and thoughts regarding technology is spread internally and externally of social groups. Technology diffusion as a concept is the cumulative result of these games being played out consistently and over time (Hall & Khan 2003).

A key concept in the area of technology diffusion is the concept of *homophily.* The concept regards the fact that ideas and communication tends to occur and be most efficient between individuals who are similar and share certain traits (Rogers 1962). Rogers basic model of technology diffusion is based on this concept, and theorizes that different people have different degrees of how likely they are to adopt new technologies and categorizes 5 groups of adopters. The model, which takes the shape of an S-curve, is well known by most innovation researchers and practitioners.

Rogers model has since been expanded and theorized around. Moore argues that the model is not as even as is illustrated, and that there exists a gap before the early majority which is hard to reach (Moore 1991). This theory is often called "Chasm theory", describing the problematic phase of reaching majority adoption whereas early adopters are relatively easy to reach for most companies (Moore 1991).

Technology diffusion research is often focused on the individual adopter as the smallest unit of measurement and regards consumer adoption of technology (Tian Xie & Johnston 2004, Püschel et al. 2010). In an effort to expand the field, Asare et al. created the TASC-model (Asare et al. 2016). The model strives to replicate earlier models created for individual adoption with the field of organizational decision-making to model the spread of B2B technologies. The complete proposed model can be seen below in figure 5.

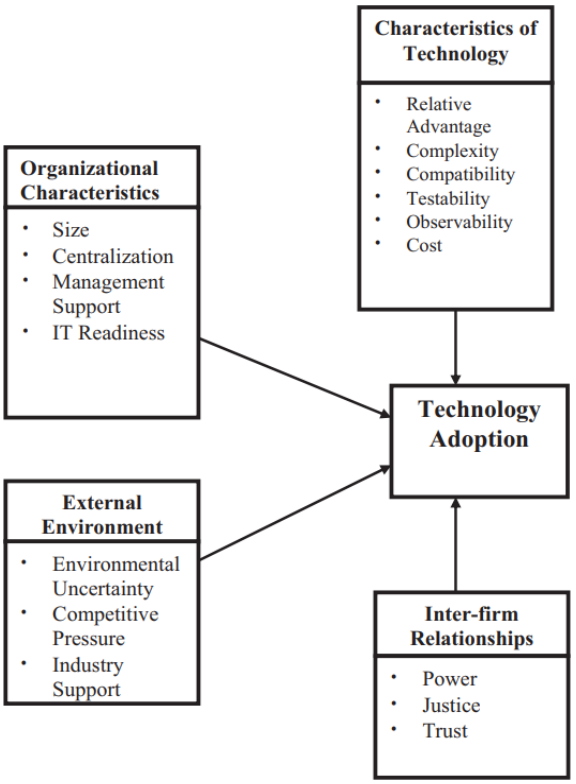


Figure 5. *TASC (Technology Adoption in Supply Chains) Model, from Asare et al. 2016*

As can be seen in the model, Asare identifies four key determinants regarding technology adoption decisions. **Characteristics of technology, Organizational Characteristics, External Environment,** and **Inter-firm Relationships**. The model itself can be seen as a development of the TAM (Technology Acceptance Model) as formulated by Davis et al. 1989, and progressed and criticized by several authors since (see e.g. Venkatesh & Davis 2000, Bagozzi 2007, Seymour et al. 2007).

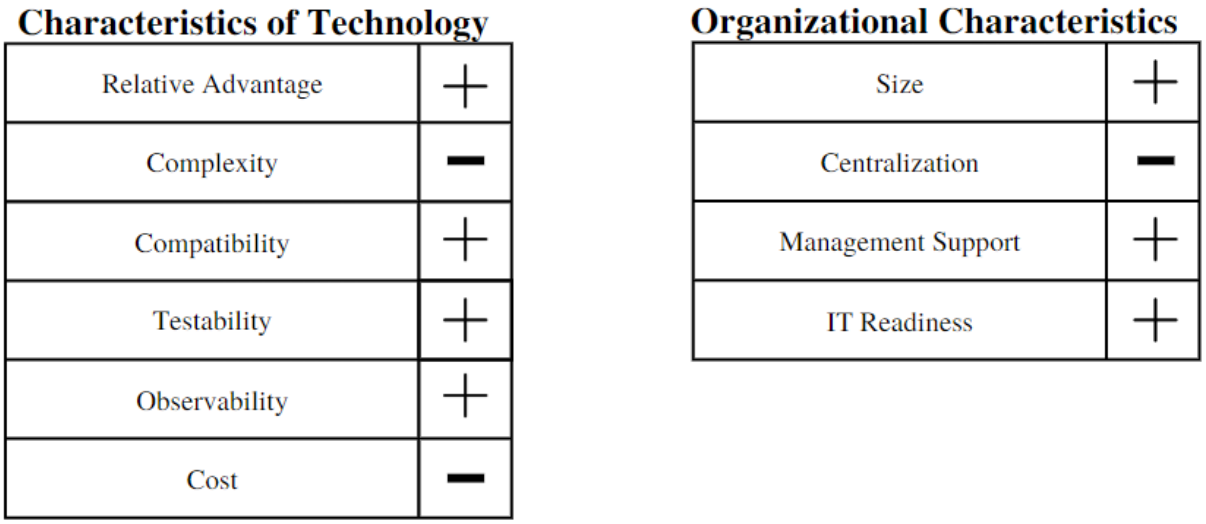


Figure 6. *Summary of influence of different factors of the TASC-model presented in Asare et al. (2016). Plus signs denote factors in which higher degrees of that factor positively influences adoption. Minus signs denote factors in which higher degrees negatively influence adoption.*

2.2.3.1 Characteristics of technology

These characteristics relate to the technology being adopted in itself and itself alone (Asare et al. 2016). Through a literature study, Asare relates the following concepts and posits the following effects regarding such factors.

Relative advantage is a classical term utilized in diffusion research, hearkening back to Rogers seminal work on diffusion from 1962 (Rogers 1962). Relative advantage can be defined as the delta of advantage received from adopting a technology in relation to the currently utilized technology (Rogers 1962). Hall & Khan defines the entire "game" of diffusion as one where the *perceived advantages* of a new technology are weighed against the strains of implementing it (Hall & Khan 2003). *Relative advantage* can be seen as the degree of "goodness" or "betterness" of a new technology. Asare, in line with Rogers and a long tradition of diffusion research, posits that higher relative advantage positively affects adoption. Relative advantage has however proven to not be the end-all-be-all which could be believed. Katz & Shapiro found that "sponsored technology" (technology which was provided with penetration pricing strategies) in many cases wins in competition even if the technology is strictly inferior (Katz & Shapiro 1986).

Complexity in diffusion research relates to three kinds of complexity, complexity to understand, to use and to implement (Asare et al. 2016). In general it is considered that high degrees of complexity negatively affects adoption. High complexity means that utilizing a new technology will be more difficult, disruptive and expensive.

Compatibility is close but not the same thing as *complementary*. Whereas *complementarity* is defined through several "parts" forming a system, such as nuts and bolts (Katz & Shapiro 1985) *compatibility* refers to the ease of making parts work in existing systems (Rogers 1962). For example, a screwdriver is a complementary product to a screw, but only if the head of the screwdriver and the screw fits, are they directly compatible. As such, high degrees of compatibility with existing systems is regarded as favorable for technology adoption.

Testability or *trialability* refers to the degree an innovation may be experienced before adoption (Rogers 1962). An example familiar to all is free samples in supermarkets where a product can be tasted to encourage buying. Free samples have in marketing literature been positively identified as increasing consumption (see Friedman 1975). The same association is made in regards to technology adoption, wherein high trialability is positively associated with technology adoption (Asare et al. 2016).

Observability is a term which refers to different things depending on the author (Asare et al. 2016). In the meaning of Asare's framework however, it regards the *observability of results*. If the results of a technology is easily illustrated, such as by KPIs, it is regarded as positively affecting adoption.

Cost of a technology can be divided into two types. Firstly there are *direct costs*, which regards directly to the acquisition of a technology, the retribution which is paid (Asare et al. 2016). In the case of patent pledges, this varies. Secondly there are *indirect costs* which regard other costs required to *implement, utilize* and *maintain* the technology. Examples of this could be indirect costs associated with acquiring complementary/compatible technology if none already exists, or costs of training personnel if required. Cost is often pointed to as being one of the most important factors in technology adoption, with higher costs affecting adoption rate negatively (Asare et al. 2016).

2.2.3.2 Organizational Characteristics

Asare et al. identify a number of organizational factors which may affect adoption of new technologies. These characteristics relate to the *adopting organization* and its characteristics. Characteristics which relate to the other party, the technology owner, are not covered by this factor in Asare's framework (Asare et al. 2016).

Size in relation to the degree of innovativeness, and conversely technology adoption, of a company is a question which is often discussed in management literature (Asare et al. 2016). Whereas smaller companies may have the potential of being less tied down to procedure and administration, they may lack the support and funds to achieve innovation (Schilling 2016). On the other hand, bigger companies have the funds but may risk becoming *mechanistic* and lack flexibility and the ability to adapt (Asare et al. 2016). Asare however theorizes, based on previous theory, that bigger size positively affects technology adoption.

Centralization refers to the degree decision-making is limited to a few actors within an organization. Rogers found that less centralized companies tend to be more active in technology adoption, probably due to a higher level of detail knowledge found in lower management (Rogers 1962). As such, high degrees of centralization negatively affects technology adoption.

Management Support refers to the degree of which senior executives (top management) supports adoption of a technology. Asare refers to Premkumar and Ramamurthy, according to whom this is especially important in inter-firm relations as they are more expensive, complex and require long-term investment (Premkumar & Ramamurthy 1995). High degrees of management support is positively associated with technology adoption (Asare et al. 2016).

IT Readiness refers to an organization's sophistication of IT management according to Asare (2016). The factor exists as a result of the specific context of the TASC framework as it generally sought to investigate IT solutions. As such, this factor will not be further assessed as it is not relevant for assessing those technologies which the relevant patent pledges refer to.

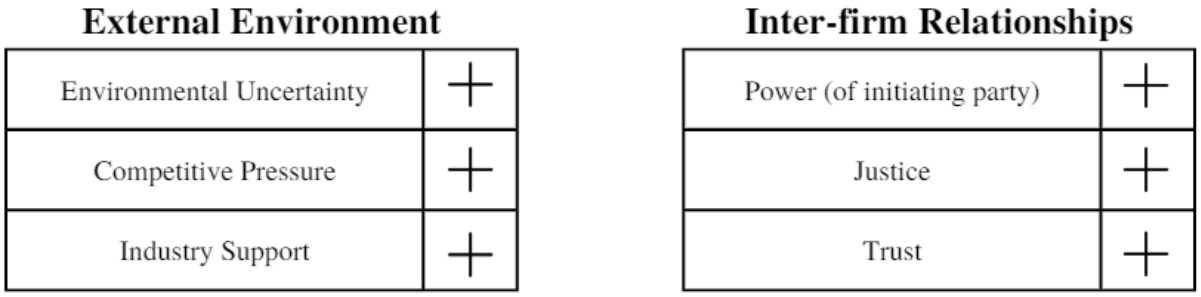


Figure 7. *Continuation of Figure 6 and remaining factors from Asare et al. (2016).*

2.2.3.3 External Environment

Asare refers to Sia et al. (2004) to define external factors as "*factors outside the organization that can have a significant impact on the organization's performance*". Such environmental issues can represent developments in the industry or other technological context as a whole which may affect the decision making of a company. An example is the development of the internet, which has affected several industries in shaping their future business models.

Environmental uncertainty refers to an overall environment where companies may feel vulnerable and to some degree desperate. If the overall development of a market is unclear and a company is unsure of the correct strategic path to choose, that may lead to them scanning for any technologies which can make them perform better. While some authors, including Sia et al. 2004 found a negative correlation between environmental uncertainty and technology adoption, Asare et al. identify more authors which found it has a positive effect. As such, Asare et al. posit that environmental uncertainty is positively associated with technology adoption.

Competitive pressure refers to such pressure as experienced by companies when their competitors or partners adopt a technology. In competitive markets, companies are pushed to remain competitive in the face of new innovation and fear falling behind in innovation. If trading partners adopt a technology, companies may adopt it for fear of losing vital partnerships in case they do not. Competitive pressure could as such be characterized as a form of business peer pressure, where inter-company relations and competitiveness may be harmed in case an actor falls behind. Asare et al. thus state that greater degrees of competitive pressure positively affects adoption.

Industry support is defined by Asare et al. as "*support from industry associations, availability of industry-wide standards and other industry-wide initiatives aimed at managing and promoting the new technology*. Such clearly defined standards tend to diminish barriers of technology adoption, by for instance lowering learning costs and overall time spent on internal development. Asare et al. posit a positive association between industry support and technology adoption.

2.2.3.4 Inter-firm Relationships

Inter-firm relationships refer to the specific organizational relationship between the technology owner and technology adopter (Asare et al. 2016). Asare et al. refer to a number of previous sources that have identified that how this relationship works and is perceived by both parties can heavily impact the adoption decision.

Power refers to the ability of the initiating firm to "*exert influence on another firm"* (Asare et al. 2016). Technology adoption usually involves one party initiating the technology transfer, and its power is seen as a strong factor in the decision-making of the other party. Power can be expressed in both more gentle and persuasive ways as well as more coercive and forceful ways. Asare et al. refer to Zhang and Dhaliwal (2009) and propose a positive association between higher *partner power* and technology adoption.

Justice does not refer to the metaphysical idea of justice in itself. It does not regard equity from an objective point of view. Rather, Asare et al. refer to *justice* as the mutual *perceptions of justice*. Essentially, if one actor feels that they are getting the short end of the deal. Asare et al. identify three forms of justice based on earlier research. *Distributive justice* refers to the equitable sharing of gains and efficiencies. Both actors perceive that they both win an equal amount from the agreement. *Procedural justice* refers to the process in which distribution is made and the perception that the process was done in a correct and fair way. It was not forced upon one party. *Interactional justice* is more concerned with actual treatments of agents. It refers to if agents of a party are treated with politeness and dignity, as well as to how information is shared and distributed between the parties. Asare et al. suggest that all forms of *justice* (or rather the perception of it) are positively associated with technology adoption.

Trust is one of the basic components of agreements. Several jurisdictions involve an implicit loyalty obligation between contracting partners, expressed in the principle *pacta sunt*

servanda (agreements shall be kept). Asare et al. refer to a number of studies which indicate that lower degrees of trust between partners leads to inefficiencies as well as acts as a major hurdle to strategic alliances (Asare et al. 2016). Further, they identify two types of trust, *credibility* and *benevolence*. Credibility refers to the belief in the contracting parties ability and will to fulfill the obligations. Benevolence refers to the belief that the other party is genuinely interested in the other party's welfare. Asare et al. points to the complexity and required involvedness required for successful technology transfer. On the basis of this, Asare et al. propose that higher levels of *trust* in all of its forms is positively associated with technology adoption.

2.2.4 Network Effects

While Technology diffusion was the most prevalent motive in Ehrnsperger's study, there is another motive whose meaning is not fully clear without context, that is *network effects*. Network effects are mentioned by Contreras (2015) as a benefit generated through product interoperability, which in turn is a motive for patent pledges. Vertinsky (2018) sees the strategic value of "free" patents as higher in industries characterized by network effects.

Network effects (also known as network externalities, consumption effects, adoption effects) as defined by Katz & Shapiro are present in such cases where:: "*the utility that a user derives from consumption of the good increases with the number of other agents consuming the good"* (Katz & Shapiro 1985). The most famous example of this is stated in Metcalfe's law. The law states that the value of a network rises exponentially in proportion to the amount of users. If only one telephone were to exist, the utility of the telephone would be nigh non-existent (for elaboration see e.g. Parker et al. 2016). The literature in the field of network effects is vast, with different taxonomies of network effects dividing them into everything from 2 types up to 16.

Studies on network effects can broadly be split into two categories, the micro approach and the macro approach (Economides 1996). The micro approach seeks to explain the mechanics of such externalities and what factors give rise to them. Conversely, the macro approach assumes the existence of network effects a priori and seeks to model the consequences of them on e.g. the market or consumers.

Katz & Shapiro proposed a typology of three kinds of network effects in their studies which can be attributed to the micro approach (Katz & Shapiro 1985).

I) **Direct Network effects**: Such effects where the number of purchasers directly affects the value of a product, as exemplified by the telephone network in accordance with Metcalfe's law.

II) **Indirect Network effects**: Effects which are not directly related to the number of users of a product, for instance instead relying on effects of complementary products. An example is that a buyer of a personal computer is interested in the availability of software for the computer.

III) Effects which arise due to increased provision of post purchase services. If more people own the same type of car you do, it is likely that there will be an increase in availability to service the car as more people are knowledgeable about it. This is especially salient in the digital age where know-how of a heavily networked product may be readily available online (Shy, 2001).

Indirect network effects as such thus arise in cases where different products have strong *complementarity*. As stated above, this factor denotes whether or not a component forms a *system* (Katz & Shapiro 1994). Examples include the familiar nuts & bolts, wherein the value of one individually is marginal. Indirect network effects for nuts thus arise if bolts gain wider utilization than competing systems such as nails.

Another component of network effects is that they are argued to heavily increase *switching costs* (Shapiro & Varian 1999). Switching costs are "*costs perceived, anticipated, and /or experienced by a buyer when changing a relationship from one seller to another"* (Pick & Eisend 2013). This can be exemplified by a financially costly or time consuming process of closing a bank account. The fact that the consumer of a good or service is aware that a process of switching to another good or service will have a cost can thus make them less likely to proceed with a switch (Farrell & Klemperer 2007). The effect which follows from the phenomena of switching costs is often called "lock-in", referring to the fact that a consumer experiences effects which encourage loyalty (Shapiro & Varian 1999). Network effects are argued to increase switching costs, and thus lock-in, due to consumers' vested interest in increasing the value of the network which they are participants in (Shapiro & Varian 1999).

On the macro scale, Shapiro & Varian argue that markets with strong network effects become “tippy” (Shapiro & Varian 1999). Tipping refers to the tendency that the market “tips” towards one actor which monopolizes or dominates the market. This is due to the strength of feedback loops, wherein the joining of one user increases the value of an offering which in turn leads to more joining etc. The reverse also holds true in that if people start switching to competitor systems, the value decreases which leads to more leaving. Feedback loops which grow the network are often called “positive network effects” while the reverse is called “negative network effects”. This effect is then further entrenched by the above mentioned lock-in effect. Shapiro & Varian argue that although this effect may seem at a glance to decrease tippyness, it may in fact increase it (Shapiro & Varian 1999). This is due to a fear in consumers of being locked in to a losing system. Consumers will seek to be part of a winning system to reduce this risk which further increases the tippyness of network based markets. Shapiro & Varian dub this effect “Bandwagoning”.

3. Methodology

3.1. Research Strategy

The research strategy of a project refers to the overarching approach to the project, including those philosophical underpinnings and assumptions which informs the methodology as well as the link between theory and method (Bell & Bryman 2019, p. 17). To assess the chosen research questions and fulfill the overall purpose, it was understood early that the methodology would require a mix of different philosophical and methodological approaches.

3.1.1 Relationship between Research & Theory

In order to fulfill the project purpose it was necessary to utilize both inductive and deductive modes of reasonings. The project can be divided in two phases. The first phase consisted of deductive study of patent pledges within the automotive industry based on the available theories on patent pledges, taxonomies of them as well as Ehrnsperger's motive framework. This phase sought to answer and assess SRQ 1. Information and the underlying research of SRQ 1 then fed into phase 2, although it did not directly impact the theoretical framework inductively. Phase 2 was firstly deductive based upon similar theories as phase 1, but also including the TASC framework of Asare et al. (2016). Through data obtained by semi-structured interviews (see chapter 3.3) an inductive phase was then initiated to analyze and assess the results and create new theory based on them.

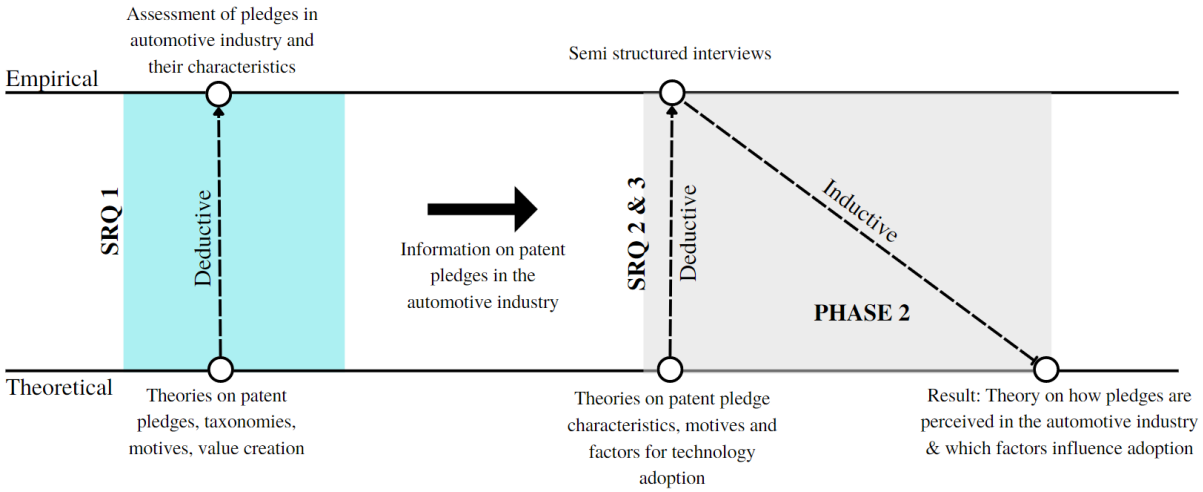


Figure 8. *Summary of the relationship between theory and empiricism of the project*

3.1.2 Epistemological & Ontological Positioning

The concepts behind the study refers to *patent pledges*, and the purpose of the project is to assess *attitudes and opinions*. These conceptualizations must be understood to be created through the ideas and social interactions of humans. As such the ontological position of the research refers to such subjects which are ontologically subjective. For the purposes of assessing the loose concepts of the subjective, they will however largely be treated as objective. As such, while patent pledges are understood to be ontologically subjective concepts, they will be treated as an objective fact, utilizing Contreras' definition as well as the pledges in themself. This is necessary as the purpose of the project is to compare and rate different factors which inform attitudes and opinions. This requires an objectification of subjective ideas. Whereas the opinions and ideas in themself are indeed subjective, they exist in an objective sense as social facts (Searle 2007). As such the philosophical underpinnings can be described as an understanding of ontological subjectivity with an acceptance of the possibility of treating it as epistemologically objective.

These philosophical underpinnings and understandings about the nature of the subject and of the socially constructed world are the fundamentals which informed the further methodology.

3.1.3 Quantitative & Qualitative Research Considerations

The understanding of the subjective nature of the research subject necessitates a qualitative study in order to seek an understanding of the social constructs under study (Bell & Bryman 2019). At the same time, the understanding that the attitudes and ideas are something existent in a meaningful manner in themself, as informed by more positivist views, require a quantitative approach to answer the research methods. As such the methodology of this study is "mixed method".

In order to assess the overall opinions and understood importance of factors in relation to SRQ 2 and 3, quantitative measures and understanding are utilized. Furthermore, quantitative approaches will be utilized thoroughly in order to avoid the tendency of "quasi-quantification" and anecdotalism in qualitative research as described by Bell & Bryman (Bell & Bryman 2019, p. 566). In order to assess the *reasoning behind the numbers*, qualitative approaches focused on textual analysis and grounded theory as a tool to reach inductive conclusions will be utilized to complement the quantitative approach. This could in

the mixed method framework of Creswell et al. (2011) be described as an *explanatory sequential design* as the quantitative data is first acquired and then elaborated by the qualitative. In this particular study, the qualitative data has priority over the quantitative as the object of the project is to explain rather than count.

3.2. Research Design - Multiple case study of current pleges

The research design of the project is a multiple case study based upon three identified patent pledges in the automotive industry: Tesla (2014), Ford (2015), and Toyota (2019). Initial scoping of the project revealed key differing characteristics both in technology field and scope of pledges in relation to existing theories, leading to them being well suited cases for the scope of this project (Bell & Bryman 2019, p. 389). The three pledges serve as the focal points around which the research questions are investigated and which interview questions are based around. The cases in particular are representative of patent pledges in the automotive industry, and are objects of interest in their own right, while also being typical examples of patent pledges. This means that the results should remain generalizable outside of the automotive industry to some extent. Both of these factors are vital for the application of the case study design to be a fitting tool (Bell & Bryman 2019). Furthermore the study contains aspects of comparative design as it is of interest to compare the three cases, where they intersect and differ, in order to draw conclusions based on the answers of the interviewees as well as compare the different factors under study against each other.

3.3. Research Method - Literature & Semi-structured Interviews

The first phase of the project (as shown in Figure 8 above) mainly concerned itself with finding data through theory and previous research as well as investigating written sources and documentation such as industry reports. These materials formed the basis from which the theoretical framework was adapted to the interviews.

3.3.1 Phase 1 - Structuring the literature review

In order to assess SRQ 1 a list of characteristics of patent pledges discussed in theory was drafted through a literature study. The model below illustrates which characteristics were identified in different sources.

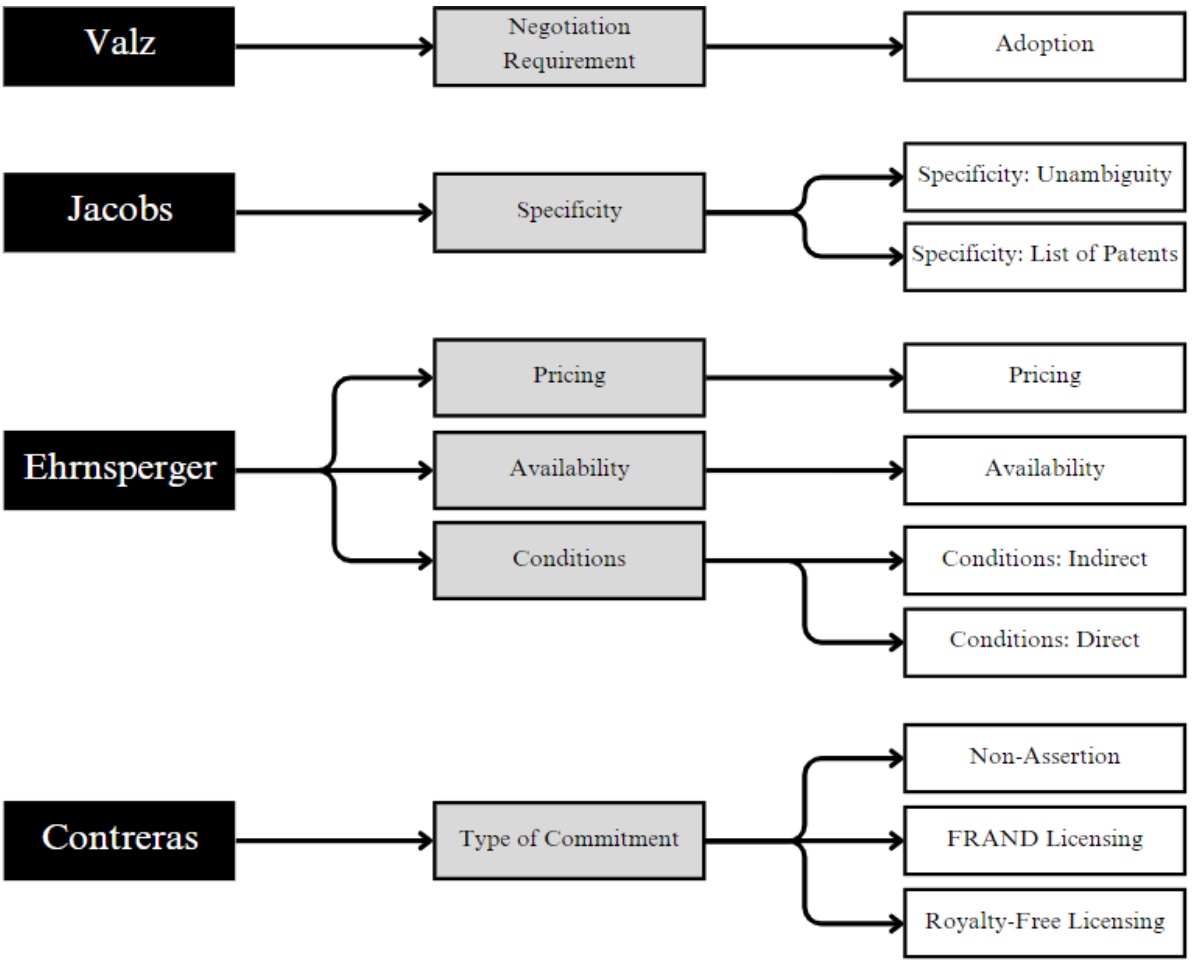


Figure 9. *Deductively Identified Characteristics of Patent Pledges*

Valz identified a negotiation requirement present in certain pledges. Building on this, we have used a characteristic called *Adoption*, and defined it as *the activities required to be taken by a potential pledgee in order to initiate utilization of the pledge*. As such, in practice there exists two different adoption options. The first is *negotiation*, as in, an actor must negotiate with the pledgor in order to initiate utilization of the pledge. The other option is what we call *Utilization*, wherein a pledgee merely has to utilize the patents in such a manner as regulated by the direct conditions to initiate utilization of the pledge. In such cases, direct contact or interaction of any kind between the pledgee and pledgor is not required. The characteristics of patent pledges under study is as such those factors to the right in the model above. Beyond that, the motives as stated by each pledge will also be assessed in order to support assessments in SRQ 2.

3.3.2 Phase 2 - Sampling and Semi-Structured interviews

Due to the subjective nature of the questions it was assessed that the most fitting method to collect data was through semi-structured interviews (see Bell & Bryman 2019, p. 435). This was also done to ensure that any preconceptions and flaws of the theoretical framework could come to light. The interview guide for the study is available in the Appendix. As such the question of sampling is pertinent. Sampling in qualitative research often revolves around *purposive sampling*. Such sampling is based on the idea of following research questions and letting those serve as indications for what units represent relevant samples (Bell & Bryman 2019 p. 389). Regarding SRQ 2-3, a purposive target is those actors who could be served by current patent pledges or otherwise find value in utilizing them. Sampling was thus made on the basis of technology area and recipient target of above mentioned patent pledges. Two of these pledges regard technology related to electrification of vehicles and one to hydrogen technology (both vehicles and fueling stations) and hybrid electric vehicles (HEVs). All pledges relate to technologies centered around hardware rather than software.

The target recipients of the pledges differ, but all take a broad scope of the automotive industries. This is well represented by the phrasing of Tesla's pledge: *"Tesla irrevocably pledges that it will not initiate a lawsuit against* ***any party*** *for infringing a Tesla Patent through* ***activity relating to electric vehicles or related equipment****..."* (Tesla 2014). As such it was deemed that a purposive sample was constituted by actors in the automotive industry, and the sample included major OEMs as well as smaller producers of components. The sample was also focused on actors with either positions or potential of producing technologies related to electrification, hydrogen or HEVs. Due to these areas representing prevailing market trends in the automotive industry at large, this applied to a large number of actors. In order to gain a purposive sample for our questions we defined the ideal interviewee as working with IP strategy and being directly involved in any potential decision regarding patent pledges within their company. As such all interviewees had experience in working with IP in the automotive industry and served such functions either currently or previously. In total 13 people were interviewed of which 3 represented OEMs and 10 suppliers. The interviewees represented companies of various sizes, with employees from the hundreds to the hundreds of thousands. They also represented companies based in various nations of both Europe and North America. Due to the semi-structured nature of the interviews, not all interviewees answered every

question in the interview guide, which accounts for differences in the amount of replies presented in the Results section below.

In order to assess SRQ 2 it was also necessary to assess subjective attitudes of interviewees. In order to quantify these, the interviewees were asked to rate their *attitude* to pledges in general on a scale of 1-5. In order to assess their perception of pledge motives, we utilized the motive framework of Ehrnsperger, since it is the most thorough and complete framework for motives for patent pledges.

To enable weighting of factors in accordance with SRQ 3, the interviews contained quantitative elements wherein the interviewees were asked to rate factors based on their perceived importance of them in such a case they were to adopt a pledge. In order to assess this we utilized the above identified *characteristics of patent pledges* (see Figure 9) from phase 1 as a framework for *Patent Pledge Specific Adoption Factors*. A constricting factor in interviewing is the time, all interviews in the present study were limited to one hour. Most interviews were however finished with sufficient time to spare for additional thoughts to be discussed at the end. This did however mean that certain factors required exclusion from the theoretical framework applied in the project. *Motive* as a factor was removed for this purpose as the motive of the pledgor was assumed to have no bearing on an adoption decision by a potential pledgee. For the purposes of assessing the *Conditions* factors, the pledges under study were studied in order to identify which specific conditions were present. It was identified that the Tesla pledge contained three indirect conditions in the form of a *Non-assertion clause,* a *No challenge clause,* as well as a *No Imitations clause.* Furthermore the Toyota pledge was identified as having a set *Duration* in a direct condition. For the purposes of rating factors, these specific conditions were rated instead. The *Availability* factor was not assessed due to the reasonable assumption that the factor will not affect the adoption of a patent pledge for those actors who are within the allowed group. Lastly, the factor *Specificity: Unambiguity* was also excluded due to the difficulty of defining in concrete terms what such a factor encompassess as well as the difficulty to assess whether or not a condition is ambiguous. Instead, the specific conditions of the relevant pledges were included.

The TASC framework as described by Asare et al. was also utilized in SRQ 3 as a framework for *General Adoption Factors.* Due to the limited time available in the interviews, and the

difficulty to communicate the differences between the factors, the framework of Asare et al. was simplified, as illustrated in the figure below.

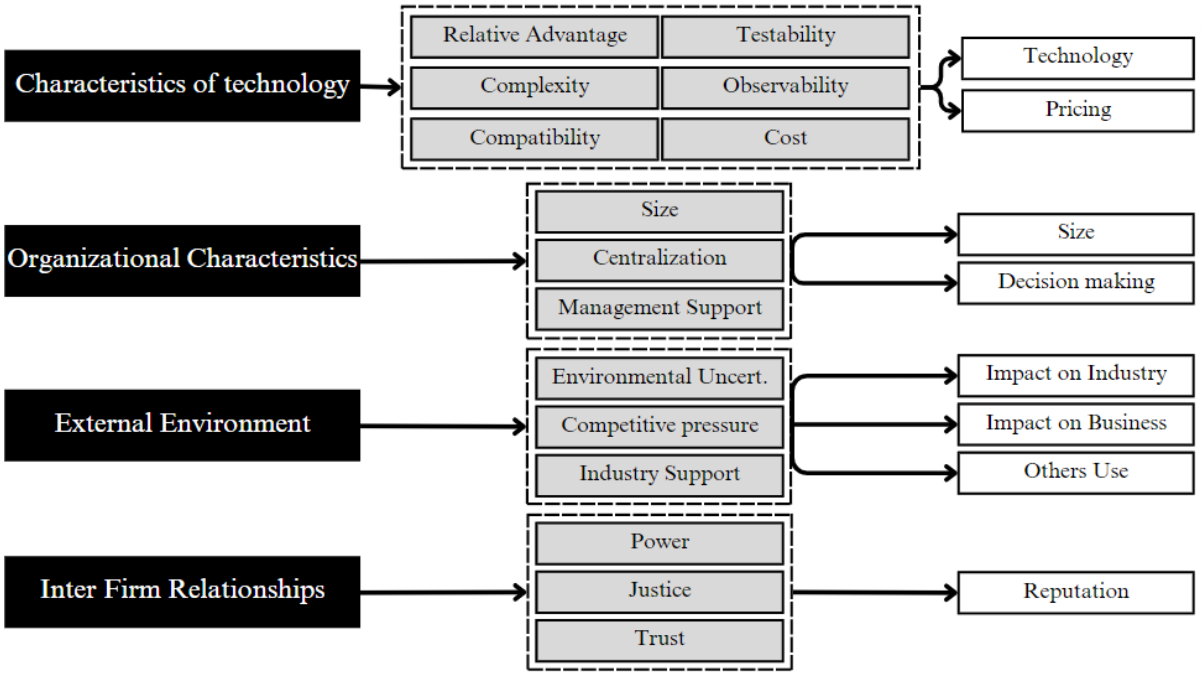


Figure 10. *Illustrated simplification of Asare et al. To the right are those Factors assessed in this thesis.*

After the simplification of Asare et al., the factors as illustrated in figure 11, below, were thus assessed, discussed and rated directly in the interviews. Interviewees were asked to rate the factors relative to each other based on how important they perceived the factor to be in assessing whether or not to adopt a pledge.

Pledge Specific Adoption Factors
Adoption
Pricing
Specificity (List of patents)
Indirect Condition: Non-assertion
Indirect Condition: No Challenge
Direct Condition: Duration

General Adoption Factors (Asare et al.)
Technology
Pricing
Others Utilization
Reputation

Figure 11. *Factors assessed and rated directly by interviewees*

Organizational factors from Asare et al. were largely assessed after the interviews with quantitative means. Factors such as size etc. were assessed to be best quantified by assessing whether a correlation existed between the size of the interviewees organization and their attitude to patent pledges at large. These factors will be discussed in the Results and an assessment if there is any correlation between the Organizational characteristics and the willingness to adopt patent pledges will be discussed. Of the organizational characteristics, *IT readiness* and *management support* were excluded. *IT support* relates directly to the purpose of Asare et al. and the nature of the factor seemingly lacks connection with any of the patent pledges in the automotive industry. *Management support* is dependent on assessing one specific technology and adoption process and can not be measured in a general manner as is the aim of this study.

3.4. Data Analysis

The data gathered through the interviews was to a large degree qualitative, and to a smaller degree quantitative. Two interview questions were immediately quantifiable. The first was about the interviewees' general attitude to patent pledges on a scale of 1-5, 5 being “very positive” and 1 “very negative”. In the second quantitative question, the interviewees were asked to rate the nine different factors listed above in Figure 11 in relation to one another.

As mentioned, the interviews were semi-structured, and the majority of the questions were open-ended, which led to the majority of the data being qualitative. A well-known difficulty in qualitative research is the large and complex dataset that it generates (Bell & Bryman 2019, p. 518). Our path through the qualitative data-set was to use qualitative coding (Bell & Bryman 2019, p. 530 ff.). The interview transcripts were first read through without taking notes or trying to make interpretations, for us to get an overview of the data. After that, the interview transcripts were read through again, this time applying codes to the interview transcripts. To facilitate the coding process and comparison of codes between the different interviews, software tools for analysis of qualitative data were used. In applying codes to the data, both deductive coding and inductive coding was used. The deductive codes were taken from theory, such as motives for pledging patents (see 2.2.2) and characteristics of patent pledges (see 3.3). For statements that did not fit any of the deductive codes, inductive codes

were used. These codes were based on themes and keywords found in the statements of the interviewees. More than one code could be applied to any given statement.

Three cycles or levels of coding were applied to generate and refine the codes (Bell & Bryman 2019, p. 533). The first level was the initial coding, when basic themes and keywords were identified. On the second level, the initial codes were refined. This included unifying different codes expressing the same concept, and placing related codes together in the same group, e.g. “Industry Logic”, “Attitudes to Patent Pledges”, and “Impact”. In total, nine different groups of codes were identified. The third and final level of coding included going through the codes again to make corrections, removing deductive codes that had not been used, and applying all existing codes to all applicable statements. It was then possible to quantify the qualitative data, and for example see that 11 interviewees mentioned “Building PR” as a motive for companies to make patent pledges. The fact that more than one code could be applied to the statements made it possible to compare how many interviewees had related “Building PR” to “Tesla”, “Ford”, and “Toyota”.

The quantitative data of attitudes to patent pledges was analyzed by a bivariate analysis, where the number (1-5) was paired with other variables, such as number of years of professional experience within IP strategy (Bell & Bryman 2019, p. 321 ff.). When relevant, t-tests were utilized in order to compare different groups of interest with each other. For the question where the interviewees were asked to rate nine different factors, both measures of central tendency and measures of dispersion were used. The arithmetic mean (average) of interviewees ratings of every factor was used to compare the importance of different factors. This was complemented by comparing the standard deviation and average deviation of the different factors.

3.5. Quality

The quality and trustworthiness of the study is affected by the limitations of time and extent. We have however tried to enhance the quality of the study to the extent possible according to the conditions of the study. The trustworthiness of a study can be divided into four criteria: *credibility, transferability, dependability,* and *confirmability.*

Credibility relates to the acceptability of the researcher's account to others. One way to establish the credibility of the findings is to submit research findings to the members of the social world who were studied (Bell & Bryman 2019, p. 363). In this research study, this was done through validating our initial findings in the interviews. When conducting the interviews, the interviewees were asked to provide their own definition of patent pledges, to confirm that our definition was in line with what they understood the concept to mean. They were also presented with our characterizations of the three different pledges, and asked to provide their thoughts.

To some degree we also used triangulation in the research study as a means to ensure credibility. The interviewees were asked to both quantitatively rate different factors in relation to one another, and to explain the reasoning behind their rating. They were also asked to describe the reasoning for their quantified general attitude to patent pledges.

Another way that we tried to enhance the credibility of the research study was by interviewing several different people working with IP strategy in the automotive industry, to not rely to heavily on the accounts of a small number of interviewees. 13 interviewees is however still a relatively low number, and if time would have allowed for it we would have liked to interview a larger number of people, to enhance the credibility of the research study even more.

Transferability of a research study relates to how context dependent the results of the study are (Bell & Bryman 2019, p. 365). Are the findings valid in some other context than the specific context studied, or in the same context at another time? One way that we have tried to enhance the transferability of the study is to use thick descriptions (Bell & Bryman 2019, p. 365). In addition to asking for quantitative answers, we also always asked for the reasoning behind the number. Through the *explanatory sequential design* of the study, the quantitative data was first acquired and then elaborated and contextualized by the qualitative data. The interviewees were also asked questions about details in their culture, such as the decision making process within their company. Furthermore the sample of several different kinds of companies, nationalities and sizes ensures that the result is not a niche opinion of a specific segment of the market. This also ought to negate potential biases against or for specific pledges based on previous interactions between the pledgor and the interviewee infecting the results. Many of the interviewees also gave us answers about specific characteristics of the

automotive industry, that makes it unique. Descriptions of the organizational characteristics and the industry logics are included in the "Results" part of the study. This makes it possible to better understand to what extent the findings of the study can be transferred to other contexts and industries, to what extent they are context dependent, and what contexts those are.

Dependability relates to the replicability of results and findings (Bell & Bryman 2019, p. 365). As far as possible this study has been made replicable through the descriptions of the method in this chapter as well as through providing the interview guide in the Appendix. It is unknown whether another researcher would find the exact same results in an identical study. All but 1 interviews were however recorded, and transcription occurred within 48 hours of the interview occurring. As such any loss of information in this step is unlikely. Furthermore the 3 cycle coding process as outlined above ought to ensure that the study as presented herein is as dependable and replicable as is possible while still upholding obligations of secrecy and anonymity towards the interviewees. Lastly, the overall professional experience of the interviewees was relatively high. The average professional experience in the industry with IP matters of the interviewees is 17 years, and most interviewees had professionally assessed one or more patent pledges. This makes it likely that such attitudes our results suggest are well-informed and well-representative of the automotive industry.

Confirmability relates to the question of objectivity and the researcher acting in good faith (Bell & Bryman 2019, p. 365). The question is interesting for this study as in a sense, the subjective ideas of the interviewees is the question. As such it is highly possible that interviewees in themself were biased towards or against certain pledges or pledgors. As far as possible, however, it was attempted to separate the pledge from the actor and assess the pledges on their own when that was relevant, and then the entire picture when that was relevant. The presentation of quantitative data in relation to interviewee attitudes and responses, thus minimizing anecdotalism, is also done to ensure the authors lack of bias and the correctness of the representations of the results provided. The appended interview guide may also serve as a way for readers to confirm that questions were asked without any bias of the authors.

4. Results & Analysis of SRQ 1 - Patent Pledges in the Automotive Industry

Research question 1 regarded the characteristics of specific patent pledges, and is worded as follows:
SRQ 1: *What characterizes the patent pledges used in the automotive industry?*

During the project, three patent pledges were identified to exist today which were created by automotive industry companies or related directly to the automotive industry. In the following chapters, each one of these will be presented and characterized in accordance with the theoretical framework. The characterization also has bearing on SRQ 2, as the interviewees attitudes towards the specific pledges will be presented there.

4.1 Tesla - The Open Model

Type of Primary Commitment	Non-assertion
Adoption	Utilization
Specificity: List of Patents	Yes
Pricing	Free
Availability	Public
Conditions: Direct	Limited to: "*activity relating to electric vehicles or related equipment*"
Conditions: Indirect	Act in "good faith" entailing: ● Non assertion (Global) ● No challenge ● No imitation

Table 2. *The Tesla Patent pledge as characterized by identified background theory*

The Tesla patent pledge is the oldest of the three assessed pledges as described in the introduction of this thesis. The initial blog post by Musk does not overly describe any form of

conditions or details for the pledge. The updated website in 2015 (Tesla 2015) does however, and it is this version of the pledge which has been assessed in the project. Of the three patent pledges, the Tesla pledge was the one which was most recognized by interviewees. All 13 interviewees were familiar with the pledge. Out of these, 10 interviewees had in some way interacted with or assessed the pledge in their professional capacity. This may be due to several reasons, one could be the fact that it was the first one and thus created more attention overall. Another possible reason is that the pledge is overall the most radically different, as will be described further in this chapter.

According to Contreras' taxonomy, the type of *Primary Access Commitment* of the Tesla patent pledge is *Non-assertion*, as Tesla promised to *"not initiate a lawsuit against any party for infringing a Tesla Patent through activity relating to electric vehicles or related equipment"* (Tesla 2015). Tesla thus makes the patents available to groups of parties involved in this kind of activities. None of the *Secondary Royalty Commitments* or *Non-royalty Commitments* mentioned by Contreras apply to the Tesla pledge.

The Tesla patent pledge was partially assessed by Ehrnsperger in his doctoral dissertation from 2021 and he placed it in the *conditional, public, free* category in his taxonomy. Our assessment of the pledge places it in the same way in his taxonomy. The pledge is specifically presented as free in the pledge document. The pledge does not direct itself to any particular actors, it does however restrict utilization of it to "*activity relating to electric vehicles or related equipment"*. In Ehrnsperger's taxonomy however, this would be characterized as a *direct condition*, as mentioned in ch. 2.1.1, this ought to lead to a minor difference in practice. The pledge presents three *indirect conditions*. The setup of the pledge stipulates that the pledge is valid for any utilization "*in good faith"*, it then states that an actor is acting in good faith:

"*for so long as such party and its related or affiliated companies have not:*

- *asserted, helped others assert or had a financial stake in any assertion of (i) any patent or other intellectual property right against Tesla or (ii) any patent right against a third party for its use of technologies relating to electric vehicles or related equipment;*
- *challenged, helped others challenge, or had a financial stake in any challenge to any Tesla patent; or*

- *marketed or sold any knock-off product (e.g., a product created by imitating or copying the design or appearance of a Tesla product or which suggests an association with or endorsement by Tesla) or provided any material assistance to another party doing so."* (Tesla 2015).

One should note when assessing these conditions that they are particularly wide. The expression "*related or affiliated companies"* is highly interpretative and leaves the question of which companies should be included in this group unclear. One can however deduce that the first point is a *non-assertion clause*, the second a *no challenge clause* and the third some form of a *no imitation clause*. The non-assertion clause is also interesting in itself as it delimits the pledgee's opportunity to assert their patents not only against Tesla, but against third parties within the industry. The effects of this is, as will be considered in ch. 5.3.1, far reaching. These would all be *indirect conditions* in Ehrnsperger's definition as they regulate the utilization of the pledge. The pledge does not in any way delineate a duration, and in fact claims that it is "*irrevocable and legally binding on Tesla and its successors"* which can be interpreted as a statement of indefiniteness.

The pledge contains a *list of patents* as recommended by Jacob (Jacob 2015). The list is 361 patents long and concerns technology relating to the electrification of vehicles. A number of interviewees however also pointed to the fact that several patents are *design patents* or technologies less related to electrification in itself and instead concerns solutions which are more Tesla specific. Relating to *Specificity: Unambiguity* the only concrete way to measure this is the opinions of the interviewees. The opinions were split on this matter. Several interviewees identified the pledge as "simple" and "straightforward". Others however described it as "vague" or "fuzzy" and remarked that it required "tighter language". This will be covered more in section 5.2.1 and 5.3.1. The opinions as given by the interviewees as such give no clear indication of whether the pledge is unambiguous or not. This points to a central problematic point regarding Jacob's recommendations. Unambiguity must be balanced against simplicity and readability. If all potential situations and use-cases were to be regulated the pledge would no doubt be far longer than its current shape. A likeness can be drawn to End-user-license agreements (EULA). Heidbrink, a Swedish professor of among other things contract law, remarks that no one realistically reads EULA for the software they utilize (Heidbrink 2019). Heidbrink even remarks that he himself attempted to read such a EULA once, but gave up after having spent 45 minutes to read and assess the first page out of

dozens. One could claim that the EULA is unambiguous and clear as it regulates and clarifies all potential situations which may arise. At the same time, the EULA is ambiguous as the sheer length and complexity of it from a contractual and legal standpoint can not be easily interpreted without significant legal labor. The same point goes for the Tesla patent pledge. One could call it ambiguous and refer to how few situations it regulates, or one could call it clear as all the terms can be identified and assessed within a few minutes.

The biggest differentiator of Tesla and the other pledges concern the *Adoption*. As mentioned in section 3.3.1, *Adoption* is defined in this thesis as the activities required to be taken by a potential pledgee in order to initiate utilization of the pledge. The Tesla pledge is the only one which has an Adoption method which we have dubbed "Utilization". This means that a potential pledgee does not need to contact or otherwise interact with Tesla in any way. There are no proceeding negotiations or signatures, the only steps required by a potential pledgee is to start using the technology for Tesla to consider it binding. As will be assessed below, this greatly impacted the attitudes of interviewees, indicating that this factor has a large impact on the efficacy and practicalities of a patent pledge.

The stated motive of the Tesla pledge was also assessed by Ehrnsperger. He defined it as *technology diffusion.* This was based upon the statement in the pledge which reads
"*...this policy is intended to encourage the advancement of a common, rapidly-evolving platform for electric vehicles, thereby benefiting Tesla, other companies making electric vehicles, and the world."* Our assessment is the same as that of Ehrnsperger as that indeed seems to be the most fitting of his taxonomy of motives.

4.2 Ford - The Licensing Model

Type of Primary Commitment	FRAND licensing
Adoption	Negotiation
Specificity: List of Patents	No
Pricing	"*available for a fee*"
Availability	Semi-public. "*Competitive automakers"*
Conditions: Direct	-
Conditions: Indirect	None stipulated in the pledge. In practice however the fact that it is adopted through negotiation may indicate certain conditions in practice.

Table 3. *The Ford Patent pledge as characterized by identified background theory*

The Ford patent pledge was made in early 2015, just a few months after Tesla's. It is the least known of all pledges assessed, with only 2 interviewees having heard of it at all, and only 1 of those having assessed it in their professional capacity. One of the potential reasons for this is a recurring argument from several interviewees, that Ford ought not to be seen as a patent pledge. This argument will be assessed below under section 5.3.2.

The Ford patent pledge has not been previously assessed by researchers to the authors' best knowledge. What is however clear is that the pledge is priced, as is written explicitly in the pledge (Ford 2015). The exact pricing is not elaborated upon, and it is unclear whether it is a standardized sum or whether it is subject to negotiation. Ehrnsperger utilizes the terminology "*below mean wtp"* to explain priced patent pledges to explain the tendency for them to make patents available for a price lower than is to be expected. Contreras at times utilize the FRAND conceptualization to do the same, despite being outside the standard context. Going forward it was assumed that the cost of the Ford pledge was in some way favorable in comparison to a "normal license" as all theory regarding the concept of patent pledges points in that direction.

According to Contreras' taxonomy, the Ford pledge would thus be classified as having *FRAND licensing* as its type of *Primary Access Commitment.* None of the *Secondary Royalty Commitments* or *Non-royalty Commitments* mentioned by Contreras apply to the Ford pledge.

The pledge does not stipulate any other terms or conditions, neither direct or indirect ones. As the adoption model is however through *negotiation* it is highly likely that some indirect conditions will apply in practice. In placing the pledge in Ehrnsperger's taxonomy however, this is without issue. As such, the pledge should be seen as non-conditional for these purposes. The pledge does however delimit the group of recipients as it states that it will only license to "*Competitive Automakers".* This could be interpreted in a number of ways. One could interpret it as Ford is only licensing to OEMs and not to suppliers. The question of whether "competitive" is utilized as a qualification for potential recipients is also unclear and whether this is utilized by Ford to exclude certain actors and what measurements are used for such an assessment must be seen as uncertain. What is clear however is that it is a direct delimitation regarding which recipients may utilize the pledge, and the pledge should as such be seen as *semi-public.* Upon placing Ford in Ehrnsperger's taxonomy thus leads to a placement in the *non-conditional, semi-public, priced* segment of the taxonomy.

The pledge does not feature any list of patents, only a reference to Ford having over 650 granted patents and over a 1000 pending in the given technology area of "*electrified vehicle technology"*. Three patents are named explicitly as being part of the pledge as examples.

The stated motive of the Ford patent pledge is "*to accelerate industry-wide research and development of electrified vehicles*" (Ford 2015). This phrasing is reminiscent of that of Tesla's, however in placing it within Ehrnsperger's model of Motives our finding is that it differs. The Tesla pledge explicitly states that the goal is a "*common platform"* indicating a wish to diffuse proprietary Tesla technology. The Ford pledge however utilizes no such phrasing as regards to diffusion of Ford technologies, but rather regarding the advancement of technology in the area in itself. As such, we find that the main stated motive of the Ford patent pledge should rather be *improving and fostering technology and innovation* as it regards directly questions of accelerating innovation in itself.

4.3 Toyota - The Middle Ground

Type of Primary Commitment	Royalty-free licensing
Adoption	Negotiation
Specificity: List of Patents	No
Pricing	Free
Availability	Public
Conditions: Direct	Limited Duration - "*last through the end of 2030*"
Conditions: Indirect	None stipulated in the pledge. However the phrase "*Contracts for the grants may be issued by contacting Toyota and discussing specific licensing terms and conditions"* indicates the presence of indirect conditions in practice.

Table 4. *The Toyota Patent pledge as characterized by identified background theory*

The initial Toyota patent pledge was made in 2015. In 2019 the pledge was updated with new wording and the inclusion of several new patents (Toyota 2015, Toyota 2019 I). For the purposes of this study, the Toyota patent pledge will be viewed as one entity, as the character of the pledge was largely unchanged in 2019 and that those patents pledged in 2015 were included in the new pledge. As such we find that it should be viewed as an updated version of the pledge rather than two separate entities. Of the interviewees, 8 were familiar with the Toyota patent pledge, and of them 4 had in some way interacted with or assessed the pledge in their professional capacity.

As with Ford, the Toyota pledge has not been previously assessed by other researchers. The pledge is explicitly stated to be "royalty free". We have interpreted this as zero pricing as any other form of pricing associated with the pledge should reasonably be assumed to be included in the pledge. The pledge indicates no indirect conditions but does however feature wording

which indicate that specific terms and conditions, which should be seen as indirect, will be present in practical application of the pledge. A direct condition which is however stated is a limited duration which stipulates that the pledge grant time will end by the end of 2030. (Toyota 2019 I). Interestingly, Toyota is the only pledge of the three which lacks any sort of restriction regarding recipients or activities for the utilization of the pledge. No wording indicates that only automotive companies could receive the pledge, as Ford does, nor that it will only relate to development of electrified vehicles, as Tesla does. As such it is in a way the most available of all three pledges as no restrictions regarding the allowable recipients is imposed. According to Contreras' taxonomy, the pledge would be classified as having *Royalty-Free Licensing* as its *Primary Access Commitment.* As with the Tesla and Ford pledges, none of the *Secondary Royalty Commitments* or *Non-royalty Commitments* mentioned by Contreras apply to the Toyota pledge. Upon placing the pledge within Ehrnsperger's taxonomy the pledge is as such *conditional, public, free.* Notably, this is the same position as the Tesla pledge was placed.

The pledge has no list of patents, and only mentions the technology areas of fuel cell vehicles (2015) and hybrid technology (2019). It also links to a visualization of the concerned patents separated into distinct kinds of technology (Toyota 2019 II). This indicates that a list of patents might exist but is not published by Toyota. The reason for this is unknown. Furthermore, Toyota features something which has not previously been identified in patent pledges. "*Toyota will provide fee-based technical support to other manufacturers developing and selling electrified vehicles when they use Toyota's motors, batteries, PCUs, control ECUs, and other vehicle electrification system technologies as part of their powertrain systems."* (Toyota 2015). This fee-based technical support is not covered by any framework, and seems to be something unique to Toyota. The purpose may be transfer of know-how required to utilize the pledged patents efficiently.

The motive as stated by the Toyota pledge is "*to encourage the development and market introduction of electrified vehicles around the world*" or to "*promote the widespread use of electrified vehicles".* We interpret this as two goals. The first is *technology diffusion* as it regards the proliferation and spread of technology. The second is *improving and fostering technology and innovation* as the development of electric vehicle technology is mentioned explicitly as a motive in itself. As such Toyota features both of the motives of Tesla and Ford

in its pledge, as well as making some allusion to a larger societal goal of minimizing pollution from vehicles.

4.4 Assessment

It can be noted that according to Ehrnsperger's taxonomy, the Tesla pledge and the Toyota pledge are the same kind of patent pledge. They would both be classified as *Conditional, semi-public free* pledges. Ford would instead be classified as a *non-conditional, semi-public priced* pledge. From a practical perspective, however, this can be questioned. As mentioned in the theoretical section, Ehrnsperger's taxonomy deals only with the *pledge document* in itself, and not with the consequences of the pledge in practice (see section 2.1.1). To a large degree, Ford's and Toyota's pledges have similar characteristics, in that they are both adopted through negotiation, and none of them states any conditions for using the pledge. Tesla's pledge is something quite different, as it can be immediately adopted through utilization of the patented technology, and as the specific conditions for using the pledge are stated in the pledge itself.

The difference of the Tesla pledge from the other pledges, and the similarities between the Ford pledge and the Toyota pledge is also something that some interviewees mentioned. One interviewee stated that the Tesla pledge is the only one "*that is something special that really has value*", and is "*really something which is not usual*", whereas Ford's and Toyota's pledges are "*not very different from the usual situation*". Another interviewee described Tesla's pledge as "*very similar to an open source software license*" but saw Ford's and Toyota's pledges as "*basically a kind of very traditional licensing program*". This will be further expanded upon in section 5.3.

It could also be questioned whether there in practice really are any unconditional pledges in the automotive industry. Although no conditions are stated in the pledges of Ford or Toyota, the fact that the pledge is adopted through negotiating with the respective company implies that conditions will apply.

5. Results & Analysis of SRQ 2 - Perception of Patent Pledges

Research question 2 sought to assess the interviewees specific attitudes to both patent pledges in general and to those specific pledges identified in SRQ 1. In order to do this the interviewees were asked both general questions about pledges, and asked to rate the concept on a scale of 1-5, as well as asked a number of questions regarding the specific pledges. The Research question is as follows:

SRQ 2: *What are the perceptions of: patent pledges, their impact, and the motivations behind them, among actors in the automotive industry?*

In the following chapters the general rating, and the interviewees arguments for the ratings will be presented. Following that, attitudes to specific pledges are presented, followed by the interviewees perception of their efficacy and impact. Lastly, the perceived motivation of the pledgor will be presented and compared to the results of Ehrnsperger 2021 (as presented in section 2.2.2).

5.1 Attitudes - General Rating

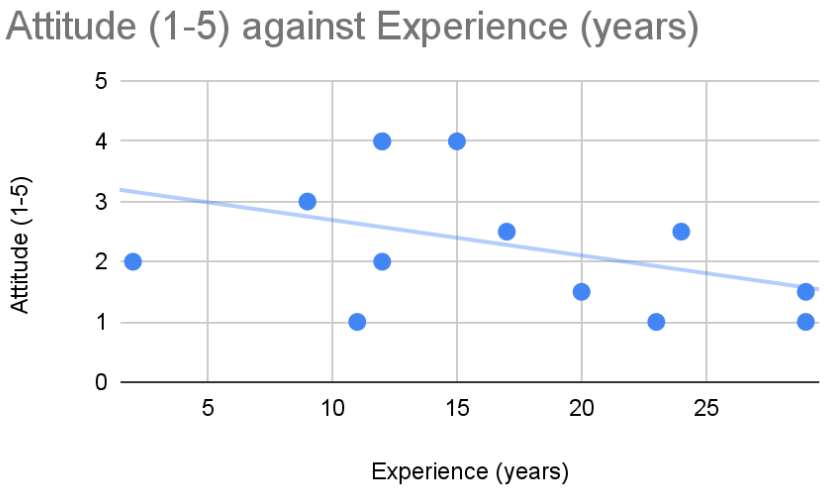
Interviewee	Attitude (1-5)
OEM 1	1,5
OEM 2	1
OEM 3	3
Supplier 1	2,5
Supplier 2	4
Supplier 3	2
Supplier 4	2
Supplier 5	4
Supplier 6	1,5
Supplier 7	2,5

Supplier 8	4
Supplier 9	1
Supplier 10	1
AVERAGE:	2,3

Table 5. *General Attitude to Patent Pledges by Interviewees*

The general attitude to patent pledges in the interviews were middling to low. As can be seen in Table 5, only 3 out of the total of 13 interviewees rated them over the middle point of 3. 1 person was neutral, meaning that the remaining 9 were predominantly negative towards the concept of patent pledges in general. An inherent risk when assessing the attitudes to a general subject however is that the attitudes towards the concept will be colored by limited experience with specific examples of the concept. For example, all interviewees were familiar with the Tesla pledge, and the majority had professional experience of it. As such it is highly possible that their attitude to pledges in general is affected by their attitude towards specific characteristics of the Tesla pledge.

In order to qualify the results it is interesting to assess whether those with more experience with patent pledges were more or less positive in general. The definition used for *professional experience with patent pledges* in this thesis is "*worked with or otherwise assessed or interacted with patent pledges in a professional capacity*". The author's assessment is that this serves well enough to separate those who have conducted analysis from the business perspective from those who have merely heard it in passing. A two sample t-test was conducted to compare attitudes to patent pledges between those with professional experience of more than one pledge and those with less. There was not a significant difference in attitude towards patent pledges between those with more (M=2.1, SD=1,2) and those with less (M=2.4, SD=1.2) pledge experience; $t(12)= 0.49$, $p=0.63$. These results show no indication that professional experience with patent pledges impact attitudes towards the concept in any way due to the extremely high p-value. Those with more experience of patent pledges generally had similar attitudes to those with less. This is somewhat unexpected as it could be hypothesized that those who have had a longer time to assess patent pledges should be able to assess their strengths. In this case however it rather seems that those with longer experience of them seem to have assessed their weaknesses equally harshly as those with shorter experience.



Graph 1. *General Attitude to patent pledges against professional experience (years) of IP strategy work*

Somewhat connected to the above is the question of whether the amount of years of professional experience of IP-work in the automotive industry somehow impacts this attitude. This is expressed in the graph above. In this graph, the trendline illustrates that overall those with longer experience overall expressed a more negative attitude. The Pearson Correlation Coefficient of experience and attitude is ca -0,42, indicating a moderate correlation between the two (Bell & Bryman 2019, p. 323). This may suggest that personal experience of patent pledges is not as large of a predictor of attitude to patent pledges as much as professional experience of IP in general is. There is a large overlap of interviewees with more pledge experience and experience in general, which is natural considering that those with more professional experience have had more time to assess all three patent pledges. Furthermore they are likely in higher positions which gives them an overview of all pledge assessments being conducted in their company.

With a basis in both of the results above we suggest that longer experience in working with IP strategy has a negative correlation to a generally positive attitude towards patent pledges, but that experience of assessing pledges specifically cannot be shown to hold such a correlation.

5.2 Attitudes Explained

The numbers above show that 9 out of 13 interviewees had a more negative than positive general view of patent pledges (lower than 3 on a 5 point scale). 3 interviewees had a more positive than negative view (higher than 3). 1 interviewee had a neutral view (exactly 3). Below, the reasons that the interviewees gave for these numbers will be presented and divided into primarily negative and primarily positive attitudes.

5.2.1 Primarily negative attitudes

This section will be divided by reasons given for negative attitudes to patent pledges.

5.2.1.1 Legal Uncertainty

Legal uncertainty was a major reason for negative attitudes towards pledges. 6 of the interviewees with primarily negative attitudes cited legal uncertainty as a reason. It was also mentioned as a concern by three of the other interviewees. Because patent pledges are a relatively young and unknown business phenomena, at least in the automotive industry, a couple of worries regarding the legal side of things seemingly made interviewees wary of the concept.

The first concern relates to the *legal bindingness* of a pledge. This concern is mostly related to such pledges which have *utilization* as *Adoption* factor. The crux is that such pledges are uncertain with regards to contract law. A legally binding agreement in European jurisdictions is commonly understood as "a meeting of minds" (Runesson 2014). As the pledge is seemingly unilateral and as no contact need occur between pledgee and pledgor, it is questionable if such a meeting of minds occurs. This specific concern was shared by 5 interviewees:

"We got a legal opinion on whether [the Tesla pledge] is as good as a license agreement. And there were half a dozen of No:s. In order to get the applicability of a pledge to the company we would actually have to had to enter license conditions to feel safe"

"If a CEO makes a statement, is it actually binding to the company? So lots of unclarity"

"That's the same with open source code that someone finds online, and the copyright holder just says 'Yes. Now it's fine to use' *or whatever. Like, yes, it's fine for you to say* 'it's fine to use'. *But I think the legal foundation isn't completely there. I think it's quite few companies that are willing to invest a lot in developing some technology based on those type of license agreements"*

"The nature of this pledge, the legal nature of this whole construct. I don't think anyone knows 100% what this entails. And I personally would be pretty hesitant to commit or to use something like this… So this is actually the major point which makes this whole construct a little bit questionable in nature, I would say."

"If there was some kind of legislation saying 'okay, we have these pledges, the pledges themselves are going to be enforceable in some way. They need to have these items assessed and have a public pledge offering, that can be asserted'. *Then, of course, we could talk about it. So if it was solved like that, you could manage the risk, you could read the clauses and what they expect of you, what you can do and what you cannot do, of course, we could use it. But having these clouds in the sky and saying,* 'look yay, you can use it'. *Yeah, that's not going to happen."*

A second concern related to that above was regarded the opportunity for the pledgor to change the pledge in such cases where there was no signed agreement. This is different from the above as the opportunities to change a pledge can be unrelated to whether or not the pledge is binding. 4 interviewees cited such concerns as connected to a negative attitude towards pledges:

"Can I change it later on? Two years later I say 'I don't think I keep it for free anymore'. *So that's kind of the little, the unknowns here, which just don't seem to be too inviting for me"*

"It's just a PR statement. And I just wonder unfortunately, I'm a little wary that one CEO can make the pledge. That CEO is gone next week. And there's a new CEO. And he says 'Haha, I don't agree with his pledges'. *"*

5.2.1.2 Not the right industry for pledges

Five interviewees cited the industry logic and market structures of the automotive industry as informing their attitude. They simply did not view the automotive industry as a good fit for patent pledges.

Two interviewees mentioned a state of patent peace and non-assertion in the industry for why they did not see the automotive industry as suitable for patent pledges:

"I was very surprised that in attending a conference, I discovered that a competitor knew that the customer was infringing some of their patents, but actually were not going to do anything about it. I even asked the question at the conference. I'm like, 'so now that you've detected this infringement. Are you gonna take action on that?' *They just basically said, like, we cannot talk about this, but basically, making themselves understood that they were not going to do anything. So there's, there's kind of, especially between the OEMs, there's a little bit of a non assertion kind of deal going on."*

"It'd be perhaps a bit different, I think, in the automotive industry. Correct me if I'm wrong, but it's not that aggressive compared to other industries. And I guess that also affects pledges a lot."

Another reason given was that patents are mainly filed for the sake of reputation in the automotive industry, and that automotive companies are not very collaborative:

"Why does the automotive industry file patents? It's basically about reputation, it's more than 50% of the answers [Referring to a report on portfolio optimisation (Cipher 2019)]*, which means it could be something like we filed 10% more patents than in the past, so we are 10% more innovative, which is probably not true. So what I'm trying to say is the portfolios in the automotive industry might not be the best ones regarding some strategic objectives. And therefore, in combination with that the automotive industry doesn't have collaboration on their radar, is probably one of the reasons why patent pledges might be not interesting for the automotive industry, from my very personal perspective."*

It was also mentioned that licensing of patents in general is not common in the industry:

"And I have to say that, maybe it's interesting to know that licensing is quite rare, I would say at [the interviewee's company] and I would say generally in the automotive industry. Licenses are not very common. So neither to give nor to take. Because I think that most automotive suppliers want to produce the things that they have invented on their own."

One interviewee mentioned the technology focus in the industry as a reason for not considering patent pledges, as companies only consider which technology is most relevant:

"In all the companies I worked or in private practice, it was always kind of more, let's say, specific technology focus, should we use switches or a touchscreen? And based on that you do not think about patent pledges."

5.2.1.3 Not good for suppliers

Three interviewees thought that patent pledges were especially problematic for suppliers to adopt:

One reason for this was due to Tesla's pledge mentioning that a party is not acting in good faith if it or *"its related or affiliated companies"* have *"had a financial stake in any assertion of any patent or other intellectual property right"* against Tesla or any third party. Two suppliers mentioned this as a risk, as it would not be possible for them to control how their customers will act:

"Actually, these patent pledges have really, really high risk for a supplier company. The main aspect is not only we have to act in good faith, but the customer has to act in good faith as well. Because if we rely on the patent pledge, and we are acting in good faith, and we are not suing anybody with our patents, and our customer, for example, VW, BMW, Daimler, or whoever, they would have to act in good faith as well. And this risk we cannot calculate, because if they are suing whoever and they will, they are all working in the field of electromobility. So even if they are, if Daimler sues BMW, on certain technology, basically in the electric field, and we delivered something to Daimler, for example. We're not acting in good faith anymore, because our customer didn't. So this is like a really, really big problem. And we as a supplier can never rely on such a pledge, because it's, we cannot calculate it anymore. It's not in our hands. So this is the main problem with this patent pledge."

"If our customers would behave in a certain way not liked by Tesla, then the pledge would fall apart. And in principle, we don't compete against Tesla, Tesla would compete against our customers and we don't control our customers. If our customers decide to enforce patents against Tesla, then basically, the use of our patent in our customers [technology] *would detach, it would fall apart, and then we would basically be liable also towards our customer."*

A related risk for suppliers was mentioned by another interviewee, that suppliers are not able to control what the OEMs would use the technology for, and only certain types of uses of the patents fall within the boundaries of the patent pledge:

"We had this kind of risk assessment from the receiving end to say, okay, so if the OEM uses this kind of technology for electric cars, we would provide that we should be covered by the patent pledge of Tesla, even if this is a Tesla patent. However, if it is done for a combustion engine, this would be probably a patent infringement of one of the Tesla patents. ... So we dropped the thought again, because, you know, we couldn't ensure that this kind of [technology] of Tesla might, maybe even if it was mentioned differently in the beginning, might end up in some combustion engine, and if [the interviewee's company] are providers, that will be outside the patent pledge and therefore patent infringement."

5.2.1.4 Merely reputational

Several interviewees stated that Reputation and PR was a motivation for companies to make patent pledges (see 5.5.1). Three interviewees also connected this to their negative attitude to patent pledges:

"I think I would have to say, maybe two, because ... when I looked into it ... it was quite hard to see any successes from it more than from a marketing standpoint."

"I mean, if a pledge would be done in a way 'Hey, I abandoned my patents'. *Then I would say* 'thank you for doing that'. *But if it's done in a way, that I have nothing from it, then I say it's a nice public move. But it doesn't doesn't help the market. So we just don't care."*

"So I think they can benefit the company from again, just a reputational perspective, but are they really changing the way the industry operates? Probably not. So I would say there's some modest benefit, but it's very modest. And I would say out of a scale from zero to five, I would be a one."

5.2.1.5 Other reasons

Apart from the above-mentioned main reasons for negative opinions about patent pledges, some other reasons were also mentioned.

One reason was that it is hard to know or show whether patent pledges are being used or not:

"No one is going to admit publicly that they use a third party patent that's been pledged. Because that will imply technologies that you may not want to imply that you use because then other patents that are not licensed to you could be implicated. So that's yet another issue. You also with pledges that don't require any counter signature, or, or acceptance process, you don't even know who cares and who doesn't care. So you tell the world, "Anybody can use these 500 patents". And you have no idea if anyone cares at all. And that's a problem because you need to show that it's making a difference. Otherwise, you're going to be accused of things like greenwashing or, or other kinds of just purely reputational benefits."

Another reason mentioned was that companies tend to pledge patents that are not core to their business:

"It's very rare that patent owners will pledge rights that are core to their business. And those are the ones that matter the most. So that's a problem."

5.2.2 Primarily positive attitudes

The main reason for people having a positive attitude to patent pledges was that they liked the idea of sharing technology.

One interviewee saw potential in using patent pledges in the area of sustainability:

"I'm open to the idea and we need to also share more things not least because of technology convergence and so on, but in areas such as sustainability, I think it's very key. The things that are carbon offset and so on you need to have access to, to set the industry baseline to have more CO2 friendly solutions and those kinds of things. So I'm very open to it, but at the same time, it's not a complete five because we are not yet there in terms of concrete examples that we can communicate in our industry, for example. So it's gonna be tough to convince people."

The same interviewee still saw the legal uncertainty as something of a concern:

"Can Tesla tomorrow say that, okay, we are closing our patent pledge, we are gonna change our strategy now, guys, I mean, we are taking away the patent pledge. I mean, I know Elon Musk has done a lot of more radical things on Twitter, but this will be kind of a weird thing to do. Once you pledge then there is no going back right, in a way. You can, but maybe it's not that simple."

Another interviewee saw patent pledges as positive for stimulating development, but was also a bit concerned about the legal certainty of the pledge:

"I'm very encouraged by the environment that's being set up. I'm just still a little wary that, you know, by making a pledge it's not a legal binding statement."

"If I knew this was working rock solid, and it was everywhere, it would be a five, but I do like the idea behind this. I think it's great for stimulating more development."

This interviewee suggested that giving out free licenses might be a better way to share technology:

"If you're really serious about it, then you hand out licenses to everybody. And maybe that would be the way that it becomes understandable."

"They can say pledges, but that doesn't stop someone from developing something on top of it, and then trying to patent that. So I just wonder if you aren't better just going back and giving licenses to people. And then being able to in that license and within that license framework be able to get access, unlimited licenses to whatever improvements they come up with. I wonder if it's just a shortcut from all the legalese in case you get serious."

The last interviewee with a generally positive attitude had limited experience and knowledge of patent pledges before the interview. The interviewee was positive to the idea, but suggested that limited knowledge of patent pledges in the industry could be a reason that they are not used more widely:

"I think it's an interesting concept. And it can help you, as I found out in our discussion, it can help both companies or the companies involved. But I think that the knowledge about it is not widespread, and not as much as would be good maybe."

5.3 Attitudes to specific Pledges

	Most preferred:	Least preferred:
Tesla	6	4
Toyota	2	5
Ford	4	4

Table 6. *Pledges by overall opinion of them by interviewees.*

Table 6 shows the amount of interviewees who preferred and did not prefer specific pledges. This assessment was made by direct questioning to interviewees. 3 of the interviewees did not give direct answers but rather answered with a larger reflection regarding pledges in general. For those interviews, the answers were analyzed and tagged to assess what pledges they referred to most negatively and positively respectively. Table 6 is a quantification of this. 1 interviewee mentioned two pledges as least preferred. 1 interviewee fully declined to answer, citing a deep general mistrust of patent pledges in general.

As can be seen the preferences of the interviewees differed greatly regarding which pledge was most and least preferable. No authoritative conclusion can be drawn regarding this question. While the Tesla pledge was generally most preferred, it also drew an equal amount of detractors to it as the others. What can however be stated is that there is seemingly no "magic recipe" for patent pledges. There are several differing opinions regarding each of the numerous factors which impact patent pledges. No patent pledge can be most appealing to every actor in the automotive industry. At least, if it is possible, none of the current pledges in the industry achieve it. The following presentation will give a general overview of the main factors which informed proponents and detractors of each pledge. For a deeper analysis of each factor, see ch. 6 with specific subchapters for each factor which provides further insight to positive and negative attitudes to the pledges at large.

In an attempt to understand these seemingly random results, Table 6 was plotted together with each other factor under study in this Thesis. The object was to analyze if any common factors

defined the groups of proponents and detractors. No correlation was found for: *centralization, experience in years, experience with patent pledges, general attitude to patent pledges,* and *what pledge corresponds as the interviewees most/least liked.* There is however an interesting correlation with size. Those who prefer the Tesla pledge are the 5 largest companies that were interviewed, plus the 7th largest. Correspondingly, those who least preferred the Ford pledge were the 4 largest. As such there may be some tentative argument that larger companies seem to prefer the Tesla pledge and to not prefer the Ford pledge. This warrants further studies into why this correlation exists. One suggestion is that it may be due to larger companies having more licensing deals ongoing, and sees the value in not having to negotiate for the pledge whereas smaller actors with fewer ongoing deals require stability and certainty in such vital business decisions.

5.3.1 Tesla - Simple… maybe too simple?

Tesla proponents mostly cited the relative *simplicity* of the Tesla pledge, relating to the *Conditions*, the *Adoption*, as well as the *Pricing*. They saw the Tesla pledge as something more preferable due to being simple to utilize and not taking time and other resources:

"*It's quite clear, quite simple, no hassle, no further negotiations, you do not have to register on a website and click through and provide your credit card details or whatever. So it's really you bring out the pledge, you are a trusted participant and follow the rules. And if not, there are some conditions to kick you out. And then you're immediately in a patent infringement situation, which you always want to avoid. So I think it's quite simple, clear. Everybody understands why it is done … this kind of motivation to roll out electric cars into the market."*

Tesla detractors on the other hand largely referenced the issues as cited above regarding *legal uncertainty* which made them untrustful of the pledge. This general issue is mostly relatable to the *Utilization Adoption* method. See 5.2.1.1 Some also cited a lack of clarity regarding the conditions and the writing of the pledge in general:

"*One of the things about Tesla is that it was unclear… I think the phrase* [in the Tesla Pledge] *was something like* 'related to electric vehicle technology' *or something. I forget the exact language now. But that is so potentially broad. So does that mean that when you park your*

car in the garage, that the inverter for your solar system, which is used to charge your car is covered?"

5.3.2 Ford - Patent pledge or normal business?

A common reaction by interviewees in relation to the Ford pledge was that it was something different than the others, either that it was not a patent pledge or that it just constituted normal business. 7 interviewees presented such a viewpoint:

"This is basically a kind of very, I would say, traditional licensing program. So you approach them, they are open, you have to negotiate… So if you go to Siemens, or Nokia, or whoever, if you ask them, can we pay you money for your patents? Everybody would say, yes, of course"

"This is normal commercial activity. I mean, the only thing that they actually did compared to the rest is that they have a technology license which is indefinite. This is, for me, not a pledge, it's like an invitation to take a license."

"So looking to Ford, that is, for my point, that was not really a patent pledge, that was a public announcement that they are ready to negotiate or to cooperate."

This reflection largely informed both Ford proponents and detractors, where proponents enjoyed the clarity provided by a more traditional model whereas detractors saw it as not valuable and not providing anything to the industry:

"I think that the one I think is easiest to assess is probably pledge 2. ... Of course there is a cost but we can negotiate that. No time limit. The clarity is what it has going for it"

"With Ford... you need a team of experienced lawyers or patent attorneys, they need to think about what kind of achievement do we want to have? What is their BATNA, best alternative to a negotiated agreement? Are there any kind of strategic thoughts and recommendations and strategies?"

On the other hand, the other interviewees did not mention this kind of perspective on Ford's pledge. On a direct question, one interviewee answered that they did view Ford's statement as a patent pledge since it was a voluntary commitment:

"It does feel like a pledge to me because they didn't have to do that. And, you know, they are offering something. They're offering something to everyone. Effectively, I mean to me that is a pledge. It's a promise to do something that they don't have to do by law."

5.3.3 Toyota - Middle ground yet least liked

Toyota had the fewest proponents of all the three patent pledges under study. The 2 proponents of Toyota cited the pros of the middle ground constituted by Toyota, and put a large emphasis on it having more legal certainty, yet remaining free:

"Kind of a promise, the license will be free, but we still have to negotiate. That could have been interesting. So I would have put most trust in that type of approach. 'I would offer free'. *I feel that is perhaps the most fortuitous"*

Toyota also had the most detractors. Detractors of Toyota overwhelmingly cited one specific factor, which was the issue of the timed *Duration.* As will be assessed in chapter 6.1.4, this was overwhelmingly seen as negative. Due to Toyota being the only pledge to have such a condition, the opinions of the specific factor largely affected the opinion of the Toyota patent pledge in relation to the others. A related concern is the general concern regarding lock-in effects from the *duration* as assessed in chapter 6.2:

"*I don't see why anyone would build up a business, knowing that their license is only limited for some period of time, and then suddenly, you've got all this liability. So to me the time limited ones make no sense at all.*"

5.4 Perception of Impact of Patent Pledges

The impact of patent pledges can be described in at least two ways: The impact on the individual company of the interviewee, and the impact on the automotive industry as a whole.

5.4.1 Impact on the individual company

The interviewees were asked whether any of the pledges had impacted the business of their company to their knowledge. The results can be seen in the table below.

Impact on company	
No impact	11
No comment	1

Table 7. *Perception of impact of patent pledges on individual companies.*

When it comes to the impact on the individual company, almost all interviewees did not think that any of the patent pledges had impacted their company:

"Internally, the discussion was rather quickly over."

"No. We've given our statement to the board and that's it. Nothing beyond."

"[Tesla] knows that we are patenting around our solutions. And we haven't seen any impact of that. And we are not sort of developing anything around battery technology, at least today. So yeah, we haven't faced any impact there. So far."

5.4.2 Impact on the automotive industry as a whole

The interviewees were also asked whether they thought that any of the pledges had impacted the automotive industry as a whole. The results are found in the table below.

Impact on automotive industry	
No impact	5
Some impact	2
Don't know	5

Table 8. *Perception of impact of patent pledges on industry.*

The perception of five of the interviewees was that patent pledges have not had much of an impact on the automotive industry as a whole:

“But I think that, unfortunately, patent pledges have some fundamental flaws. And I don't think they move the needle very much in general.”

“My sense is that it has not impacted, my sense is that a lot of companies are hesitant to adopt something like that and that it has not done as well as Tesla hoped. I can of course not say this objectively but it is my gut.”

Some of these five interviewees based their answer on discussions with other companies and conference topics:

“To two or three people, I've spoken more on our customer side, they had independently had similar concerns and all say "We cannot really work with that". And so it leads me rather towards saying it has had no impact.”

“So as long as I have been on conferences or meetings or such things those patent pledges never have been a point of discussion.”

On the other hand, two interviewees did think that patent pledges have had an impact, mainly from a marketing standpoint:

“I think that some of them have had success with what they were doing, especially specifically Tesla, as I said, I think, from my perspective, the goal of Tesla with this pledge is marketing. To make people talk about them, being the news, and what not. So I think it was like a tremendous success from that perspective. And of course, they have a huge share of the electrified vehicle market now. So I think it was not the only thing that made them reach that market share, but certainly something that contributed to that. So I think it was a very good, very well thought move from their side.”

“With the Tesla pledge, they rocked the boat quite a bit. But not sure exactly what exactly? Yeah, I think that got a lot of media coverage. And many people talked about it, I think, in conferences and everything.”

Five interviewees mentioned that they did not know what the impact had been:

"You know, I really don't know the answer to that. I wish I knew. I don't know."

"But I don't know, if other companies welcome this and also want to take part in this idea or if they are not interested."

Some noted that the impact in general is hard to measure, due to the nature of the pledges:

"Another problem is: No one is going to admit publicly that they use a third party patent that's been pledged. Because that will imply technologies that you may not want to imply that you use because then other patents that are not licensed to you could be implicated."

"Very hard to know especially as there is no information regarding adoption."

In order to assess the impact of patent pledges, the interviewees were also asked regarding how often patent pledges, either as a concept or specific pledges, were discussed in their organization. The responses are presented in table 9.

Yearly	Less than yearly	One occasion / pledge	Never
3	4	2	3

Table 9. *Occurrence of patent pledge discussions within interviewees' organization*

All in all, these results indicate that patent pledges are very seldom discussed within the IP departments in the automotive industry. No interviewees discussed patent pledges more often than perhaps once a year. This supports the prevailing view that patent pledges have had an overall marginal impact on the automotive industry and the actors within it. As such, it is possible to conclude that the perception of the impact of patent pledges is that they have overall not impacted the functioning of the industry and have had a limited effect overall. The functionality of pledges to achieve technology diffusion in this context may as such be questioned.

5.5 Perception of Motives - No such thing as a free lunch

For the purpose of assessing how patent pledges are seen in the automotive industry, the interviewees were asked what motives they perceived to be behind patent pledges. As can be seen in the table below, the most common motives ascribed to the Tesla pledge were *Reputation & PR* and *Decreasing patent threats*. *Technology diffusion* was also featured. For Ford, the motives of *Reputation & PR* and *Promoting additional monetization* was mentioned. In general, less people made any comment about the motives of Ford, which can be explained by the fact that only 2 interviewees had heard about Ford's patent pledge before the interview. When it comes to the Toyota pledge, the most commonly mentioned motives were *Technology diffusion* and *Promoting additional monetization*. A number of other motives were also mentioned by the interviewees, but not ascribed to any specific pledge in the automotive industry. The full table of mentioned motives is found below.

	Reputation & PR	*Technology diffusion /ecosystem & infrastructure growth*	*Promoting additional monetization*	*Decrease Patent Threats*	*Improving and fostering technology and innovation*	*Standard setting and fostering interoper-ability*	*Fostering sustainability*	*Foster collaboration, open innovation and resource pooling*
Number of interviews mentioned	11	11	9	5	3	2	2	1
Tesla	7	2	-	4	-	-	-	-
Ford	4	-	2	-	-	-	-	-
Toyota	2	6	5	-	-	-	-	-

Table 10. *Perceived motives of patent pledges.*

Based on the table above, a model similar to Ehrnsperger has been constructed featuring the results of this study (compare with figure 4 in ch 2.2.2).

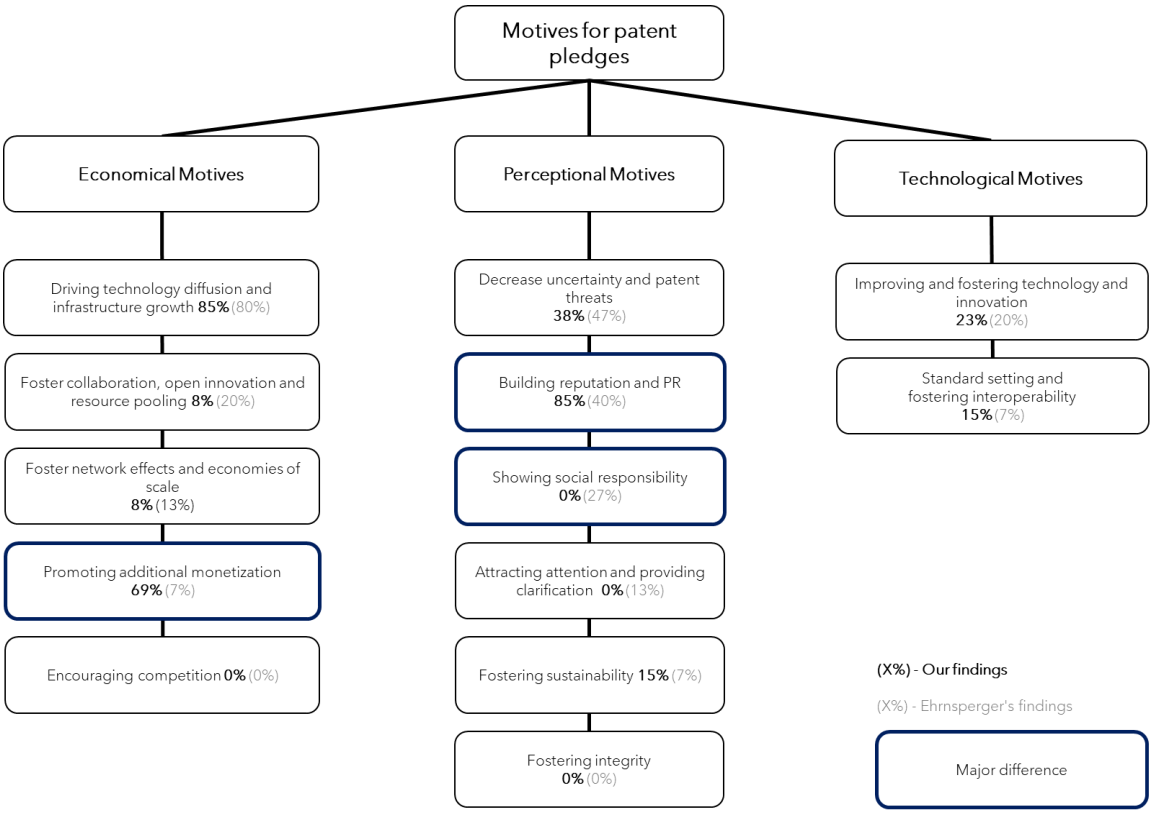


Figure 12. *Results of the study of motives in Ehrnsperger's model*

As can be seen, our results are similar to Ehrnsperger in that *technology diffusion* is the most common motive. Furthermore, there is little difference in our results and Ehrnsperger's regarding *Encouraging competition, Decrease uncertainty and patent threats, Fostering sustainability, Improving and fostering technology & innovation* and *Standard-setting and fostering interoperability.* We have also reached the same results as Ehrnsperger in finding no interviewees citing *Encouraging competition* and *fostering integrity* as motives. There are however some key differences when it comes to other motives. Firstly, promoting *Additional monetization* was only seen in 7% of Ehrnsperger's study, whereas in this study it occurred in 69% of interviews, almost 10 times as often. *Building reputation & PR* occurred in 40% of Ehrnsperger's study, and in this study 85%. This makes it equal to *Technology diffusion* as the most common motive, whereas in Ehrnsperger's study it is the third most common. Furthermore, our study found that no interviewees discussed *Foster network effects and economies of scale, Showing social responsibility,* and *Attracting attention and providing clarification*. Ehrnsperger found significant portions of each in his study.

It can be concluded that the perceived motives for patent pledges in the automotive industry has some key differences from patent pledges overall. That *Additional monetization* was more prominent in the automotive industry likely has to do with the fact that Ford's pledge makes patents available for a fee. Particularly, however, it has to do with Toyota's pledge, since 5 interviewees mentioned this motive in relation to that pledge. This is remarkable since Toyota's pledge is free. However, several interviewees suspected that Toyota would require a licensing fee after 2030 when the pledge has ended. This is discussed in further detail later on in the thesis (see section 6.1.4).

The fact that *Building reputation & PR* was mentioned by more people in the automotive industry than in general, likely has to do with this being their impression of the Tesla pledge. Seven interviewees cited this as motivation for Tesla to make their pledge. As the Tesla pledge was the only pledge that all interviewees were familiar with from before (see section 4.1), it is a reasonable assumption that people in the industry associate patent pledges as a concept most strongly with the Tesla pledge.

Overall it seems that those motives which may be described from a more altruistic perspective in seeking to achieve a benefit for the market or the world as a whole are not highly represented. This is related to Contreras' conclusion that pledges are sometimes framed as being philanthropic for the sake of PR benefits, despite the primary motive being something else (see section 2.2.2). Those motives which are prominent in our study, such as *Technology diffusion, Promoting additional monetization* and *Building reputation & PR*, are those which represent mainly a positive for the pledgor rather than the pledgee or other actors. A slight exception might be *Technology diffusion,* as the spread of technology and infrastructure may provide benefits for the entire market, but the primary benefactor will still be the pledging company. As such there are indications that actors in the automotive industry do not primarily see the pledge as a tool meant to provide benefits widely, which is to some extent the *stated motive* of all three pledges as presented in ch. 4. Patent pledges are primarily interpreted as a business strategy meant to create a competitive advantage of some form for the pledgor.

Below, some considerations and quotes will be provided for each of the cited motives.

5.5.1 Reputation & PR

Reputation and PR was mentioned as a motivation by eleven interviewees. Seven of them mentioned this motivation in relation to the Tesla pledge:

"So what we have said I think it was a very good PR stunt they have done. So that is because I think they had a lot of attention with this patent pledge there, maybe that's what he had that in mind. I don't know. But it is a fact that I think there was great attention in the different media."

"So this is a, I mean, it looks a little bit like a PR announcement. And actually, I think it made a lot of headwind [means tailwind] *for Tesla on the public side."*

Four interviewees saw reputation and PR as a motivation for Ford to make their pledge:

"The Ford one may have another aspect: an aspect as being seen as someone who shares technology and is open, does not stop innovation in their field."

"Also, what Ford does was also from my point of view, a public relations stunt."

Two interviewees mentioned this motivation in relation to the Toyota pledge:

"...the others might have felt, 'Hey, that pledge gives us the opportunity to picture to our investors or the general public that we are also strong in electrification of vehicles or we are strong', *and that's true for Toyota, in hydrogen fuel cells. So to make the public aware that this is out. And you know, this is a way to have a word out in the market that this company does something specific, which others don't do."*

5.5.2 Technology Diffusion

When Ehrnsperger studied the motives for making patent pledges, technology diffusion was the overwhelmingly most prominent one. This was also the most prominent motive according to the perceptions of the interviewees in our study. Eleven interviewees mentioned this as a motivation for making patent pledges.

Six interviewees mentioned technology diffusion as a motive for Toyota to make their pledge:

"Again, Toyota would be for me, the traditional patent pledge, you want to roll out a new type of technology. And probably in 2015, there were a lot of experimental cars around and maybe for Toyota, this was this kind of, okay, how can we introduce fuel cells and hybrid technologies on a broader scale into the market in addition to the combustion engine."

"Probably for Toyota, again, this motivation to roll out fuel cells into the market. And the more you're getting this kind of push also, from their kind of technology in the market, it might be broadening the introduction of a new technology into the market."

Two interviewees mentioned technology diffusion as a motive for Tesla:

"They want to grow the market. They want their type of technology to be more spread in the world. So that they can sell their cars better. And I don't know how good it works. But I understand the idea from Tesla."

"...this concept that you want to roll out something in a market, I wouldn't say for free, but you know, to encourage customers and markets to trust a certain type of technology, might sometimes be a very interesting strategic angle. That you say, okay, so whoever wants to use, and, for example, in the Tesla case, whoever wants to use electric cars, falls under this patent pledge, and it's about rolling out and I think it's also directly written in the patent pledge of Elon Musk."

No interviewee mentioned technology diffusion as a motive for Ford to make their pledge.

5.5.3 Promoting additional monetization

The motive of promoting additional monetization was mentioned by nine interviewees. Five of them mentioned it in relation to Toyota's pledge. This is interesting, considering that Toyota's pledge is free, and thus not connected to any direct monetary compensation. Indeed it stands in direct opposition with Ehrnspergers claim that "*this motive only is relevant for*

pledges where there is compensation involved" (see section 2.2.2). There were two reasons that people still thought that Toyota had additional monetization as a motive.

One reason was that the license agreement ends in 2030, which interviewees understood to mean that Toyota would require licensing fees after that:

"But I would say, in practice, and my experience would be, you sign a contract until 2030 on this technology, and Toyota has a huge portfolio in any area. So they are a really global player on patents. In 2030, the license agreement runs out and is ended. And the next day, Toyota tells you, it's great that you use my technology now you can please pay for it. I mean, this will happen. It's like an incentive to tell Toyota that you are more or less implementing the technology. And afterwards, they can cash in."

"That's a good idea from Toyota. They want to grow the market first, and then collect the money."

Another reason that interviewees saw additional monetization as a motive for Toyota was the fact that they provide fee-based technical support to manufacturers:

"Toyota thinks of this as a business to sell their technology as a service to others."

"So yeah, and the fee based technical support is also a little bit, I would think about it and say what is this actually, what do you want? ...it looks fair on the surface, but it's actually probably also something to generate income."

Two interviewees mentioned additional monetization as a motive for Ford:

"Ford filed a lot of more patents, I think it started in 2013, or 14, than their competitors and compared to the past, which might be an indication, in combination with this patent pledge or licensing program, that at that time, they thought, okay, we're filing more patents and setting up these licensing programs, we can make money."

In assessment, the interviews indicate that *promoting additional monetization* is a relevant motive even in such cases where the pledge is not priced, in contradiction to Ehrnsperger.

While the fee-based technical support may be seen directly as a cost in some description, it is also apparent that there is a suspicion of monetary motives when a pledge has a limited *duration* as well. Additional monetization was not mentioned as a motive for Tesla, which can be explained by the fact that their pledge is free and without any time limitation.

5.5.4 Decrease Patent Threats

The motivation to decrease patent threats was mentioned by five interviewees. Four of those mentioned it in relation to the Tesla pledge, which was the only pledge for which this was seen as a motivation:

"The Tesla pledge is a way to neutralize the IP field to themselves, hoping that Tesla won't have to care about other people's patents in the industry, that is how it comes across to me."

"And I think the Tesla pledge in particular is rather confusing, and the scope is like, I can't understand it, but that to me feels very much like you know, Elon wanted to sort of eliminate patents as an obstruction. And this was his way of doing it."

This motivation was not mentioned for either Ford's or Toyota's pledge.

5.5.5 Other motives

Apart from these motives that interviewees related to specific pledges in the automotive industry, a number of other motives were also mentioned. These motives were however not mentioned in relation to Tesla's, Ford's, or Toyota's pledge, but more generally as possible motivations to make patent pledges.

Three interviewees mentioned *Improving technology* as a motivation for making patent pledges:

"For example, to foster the development of this technology."

Two interviewees mentioned *Standard setting* as a potential motivation:

" A patent pledge tries to invite companies to use the technology, and perhaps develop the technology further. And this is actually an area where standardization comes into play. ... And then a standards organization or SDO might be willing to look at the pledge as a

commitment, and it might invite other companies to say, okay, the one company who has developed the technology is pledging. The SDO, the standardization organization, wants to take that technology, take it up and develop it further with other companies."

Lastly, the motivation of fostering open innovation was mentioned by one interviewee:

"It can also be a good way to sort of do open innovation, to get a new pair of eyes into an existing company's sphere of influence, maybe. Structure open innovation activities, maybe in some ways."

The other motives identified by Ehrnsperger (see 2.2.2) were not mentioned by any of the interviewees.

6. Results & Analysis of SRQ 3 - Factors for Adoption

Research question 3 aimed to research what specific factors and characteristics that influence pledge adoption. In order to achieve this the interviewees were presented with a number of characteristics, as presented in ch. 2.3, and asked to rate the factors in relation to each other and explain their reasoning. The Research question is as follows:

SRQ 3: *How do various characteristics of a patent pledge and other factors influence the decision-making of actors in the automotive industry regarding the adoption of pledges?*

In the following chapters firstly the entire rating of all factors will be presented. Following that, each factor will be considered and the reasoning of the interviewees will be explained. Thirdly, factors mentioned by interviewees outside of the deductively identified factors will shortly be considered. After that, Organizational Factors as defined by Asare et al. will be assessed to investigate if there is any correlation between the Attitudes to pledges as presented in ch. 4.2 and these factors.

6.1 Factors - Rating

	Average Rating (1-9)	σ	Average Deviation
Technology	1,44	1,33	0,79
Adoption	3,44	1,88	1,48
List of Patents	4,22	2,64	2,25
Duration	4,56	1,88	1,48
Pricing	4,89	2,26	1,88
Non Assertion	5	2,24	1,78
No challenge	5,33	2,12	1,70
Reputation	6,44	1,88	1,51
Others' Utilization	7,44	1,94	1,63

Table 11. *Average Rating of Factor importance for Adoption. Results based on those 9 interviewees who were open to the idea of pledges at all. Standard Deviation for each factor presented in the middle, and Average Deviation on the right.*

In order to quantify the importance of the factors for pledge adoption, the interviewees were asked to rank the factors based on how important they were on a scale where 1 signified the most important, and then scaling down in importance with 9 being the least important. Interviewees were allowed to rank factors as equally important if that was considered to be correct. As can be seen in the table above, the most important factor was quite handedly *Technology*. The least was *Others' utilization*. In the following chapters the results for each factor will be assessed and discussed. Specifically the argumentation as presented by interviewees will be explained.

A few things can however be said in general regarding the results. Firstly, the standard deviation ranges from 1,33 to 2,64. This is relatively high, an effect of the sample of the study being on the smaller side. It should be noted that only 1 interviewee rated *Technology* as not being the most important, and yet the standard deviation rises a significant amount because of it. As such, the deviation of the rating prevents making sweeping conclusions regarding the rating. The rating however serves as an indication of prioritization, with larger deviations representing more contested factors. For the purposes of this study, wherein the qualitative has priority over the quantitative, this is sufficient. In general it could be said that it is clear which 2 factors are the most important and which 2 are the least important. In the middle the results are less clear and the internal rating between them is more doubtful. Despite this there is however a clear difference in rating between the top factor of the middle (List of patents) and the bottom (No challenge). As such, when assessing it may be doubtful if *List of patents* is more important than *Duration*, but quite clear that it is generally more important than *No-challenge*.

6.1.1 Technology - Technology is king

Technology as a broad factor was rated number 1 by far. Of all the interviewees, only 1 did not rate it in the top. This is hardly surprising, but it does indicate that zero-pricing of patents does not automatically make other companies more interested in a given patent. Several interviewees saw *Technology* as a precursor to any other decision making, saying that the relevance of the technology was required to be high to initiate any further adoption proceedings or further analysis of a pledge:

"*I would say technology has to be very relevant, because it's just starting a process with negotiating and evaluating. I would never start to evaluate the Ford patent pledge, or electrical vehicles because we don't work with that*"

"*If you even want to engage in any type of pledge, or discussions and negotiations and all that [the technology] has to be very, very relevant, I think*."

"So technology would be the first if I am using it, actually. Because otherwise I know I don't need any license or the possibility to use it."

Related to this is Asare et al's. definition of Relative Advantage. Several interviewees either explicitly or using other words posed that this was the most important factor of all:

"At the end of the day, it must be something which really shows a clear advantage for your company."

"If there are advantages, which are very important for my employer, and gives us something which we do not actually have, then I would promote it in the company with the board. But yeah, this must be there. And so you need to have a good understanding, for example of the Tesla patent portfolio."

Furthermore, it was clarified that the companies highly valued having the internal competencies themselves to manage this technology. It was clarified that several interviewees feared becoming dependant on another actor, and so wished to ensure that everything following the pledge could be managed in-house:

"If we are making a decision, we want to base it on our own competence. Even if we go into new technologies, we first try to get our own competence to understand what is in that technology. For example, by cooperations or something like that before we make a big impact decision. So first of all we need our own competence on that. We would never rely on black boxes."

Some interviewees also theorized regarding what *types* of technologies would be attractive in a patent pledge. While this is slightly outside the scope of the study, the theorizing is

interesting enough to warrant academic exposure. In essence, most interviewees thought it fit best for grander, radical technologies, and not so much for smaller innovations:

"Let's say, a new technology will be developed apart from EV and hydrogen. And that technology is actually very specifically developed by one company. And that company is pledging something similar to Tesla. And the industry is looking at that and developing in that direction. I mean, it might make sense to consider also to take them up on the pledge"

"This is such a high level that this could not apply, let's say to, could I say less relevant technologies like okay, so what kind of technology do you want to have to switch on your lights?"

In summary, it is obvious that technology factors are the primary factors considered when automotive industry companies assess technology adoption. This is seemingly true no matter the contractual shape of the technology transfer, and goes for licenses and pledges alike. "Free patents" does not seem to be a convincing enough reason, contrary to the strong proven impact of "the free effect" (Gal & Rubinfeld 2016).

6.1.2 Adoption - The missing part of the puzzle?

As mentioned above in section 2.1.1, the Adoption factor comes from the difference identified by Valz regarding how a potential pledgee accepts a pledge. As such, there are two identified manners in which a pledge can be Adopted. *Negotiation* refers to those pledges which contain a negotiation demand. Conversely, *Utilization* refers to those which lack it such as the Tesla pledge. In such cases the pledge could be considered binding as soon as a pledgee starts utilizing a pledged patent. The opinions regarding the importance of the Adoption factor as given by the pledgees could largely be described as being in these two camps. Some supported the Negotiation option, whereas some supported the Utilization option. In total, 8 interviewees preferred *Negotiation*, 3 preferred *Utilization* and 2 were undecided. Only the 2 who were undecided did not rate Adoption as one of the top 3 most important factors. As such, for those with concrete positions, Adoption represented a main consideration.

Negotiation

Proponents of Negotiation cited the option as being more comfortable in most ways. Several of them maintained that negotiations offered *flexibility* and *adaptability* as both companies could reach a common understanding:

"When you go into negotiation it is better, because basically, when you take a look at the patent pledge then there are patents of interest. Otherwise you do not even take a look at the patent pledge. But usually, if you identified patents of, for example, Ford and they are quite interesting, then you indeed would go for a negotiation like try to get a license on good conditions. Maybe on the whole portfolio in the technology field, or only for a single patent"

"I see the benefit of negotiations, because it's still some level of control of the technology and control of the market to some extent, if you want to shape it a certain way. Because you can, for example, choose certain actors to promote certain alternatives that are coming up"

As was discussed in section 5.2.1.1, a key conclusion from the interviews was a prevailing concern regarding the legal uncertainty of patent pledges and their bindingness. This is connected to Adoption. Negotiation was seen by several as being a safer alternative, in that you would have a signed and binding contract regarding the patents:

"Talk is cheap. Unless we actually have a licensing deal, we wouldn't use any third parties IP"

"Because as I discussed before the enforceability of such a pledge, or the use of it, it just brings risks into the equation rather than anything else, right. So without the pledge, it's clear what you have to do. Like you have to go and ask for a license."

Those who preferred the Utilization option however noted that Negotiations are time consuming, and may be more uncertain than simply utilizing the technology:

"The first is that you do not have to negotiate, that you do not have to get in touch with the proprietor. Because that's time and effort. So if you do not have to get in touch, that's the most important"

"All these kinds of negotiations always generate uncertainties, complications. Thinking about strategies, it's not clear. You do not know the strategy and negotiation tactics of the pledgor. probably over the years, also, your perspective changes."

Utilization

Proponents of utilization cited the simplicity and clarity of not having to negotiate as well as the accessibility provided by the open manner of adoption:

"And that is all then part of this negotiation and the agreement. And therefore the most easy thing is really Tesla. We do this. Don't do that. That's clear."

"It's quite clear, quite simple, no hassle, no further negotiations, you do not have to register on a website and click through and provide your credit card details or whatever. So it's really you bring out the pledge, you are a trusted participant and follow the rules. And if not, there are some conditions to kick you out. And then you're immediately in a patent infringement situation, which you always want to avoid. So I think it's quite simple, clear. Everybody understands why it is done, or at least, you know, we thought this kind of motivation is to roll out technology"

Detractors however viewed Utilization as *unclear*, *undefined* and at worst *unenforceable:*

"I would say, just looking at everything together the risks are too high because you do not know what you sign up to"

"We would actually have to enter a license agreement to feel safe"

"That's what I don't like about it, that Tesla, on a prima facie it seems that they don't need a licensing agreement, and they are not expecting one. But I don't think that we would be the only company to be very skeptical about that situation. It introduces a lot of risks that are not accounted for in the risk assessment. So I don't think I could sleep at night with that."

In summary it can be stated that while opinions differ, the majority of interviewees preferred Negotiation to Utilization due to superior possibilities to clarify, gain "*some wiggle room"* and reach a common understanding.

6.1.3 Specificity: List of Patents - Vital for certain adoption types, not for other

The question of a specific list of patents turned out to be a larger one than we were aware of. Several interviewees expressed differing opinions in general regarding technology transfers whether it is best to clearly delimit it, or give a blanket statement regarding a technology area. This largely explains the large standard deviation of the rating of lists of patents, as some saw it as important to exist (6), some important to not exist (2), and some were indifferent towards the idea (2).

Here is how some of the interviewees who found patent lists important reasoned:

"Patent lists in license negotiations is generally a good idea, I believe. And if you depart from that, like if you say this whole technology, then you have a lot of section points more or less, where you have different industries, different technologies being used in a patent or being covered in a patent. And then you have the problem of discussions about whether certain patents are included."

"And the list of patents I think that's super important. Also having the actual claims would be very important to know depending on the technology and then you have to have the list of patents"

"A lot of licensing agreements, they always want to be vague on what you're licensing, especially with the big portfolios. So they want to say things like 'Oh, yeah, I license all my patents on 3G technology'. *And if you ask, okay, so which patents are you licensing? They're like* 'all of them, all of them for 3G'. *So that's because they don't even know what they have."*

The two interviewees who did want a list of patents focused on the importance of getting true freedom to operate or access to technology:

I think [a pledge] is only beneficial if the pledgee has a true freedom to operate. Because whenever you negotiate a license you don't say 'Give me half the patents I need'. *You're like,* 'I need freedom to operate, I have a business, I don't want to worry about you anymore. Give me a license to whatever I need to run my business.' *And occasionally there's carve outs, but generally, no one's going to pay for a half of a license.*

"A lot of it depends on what you are looking for. If it's access to technology, having it limited to a specific patent list can be a risk, if a company adds patents to the technology area, so they cannot block me from using the technology, if the company adds on more patents"

Here is how one interviewee, who did not find the factor of a list of patents important, reasoned:

"List of patents is not so important. So for example, if you're looking at Toyota with 24,000 patents offered, you can go in each of those patents. So the list of patents as such, it's not so important, because it's publicly available, if you need something specific you can look in it, but it's not really necessary if you are negotiating about portfolios."

Most of the proponents of list of patents were however happy with not being provided a list of patents before negotiations started for that adoption method:

"It would be best if we had a list of patents. Then it's much easier to assess the strategic fit. But then if for whatever reason, the list of patents cannot be published as part of a pledge, if it is disclosed as part of a negotiation, I'm fine with that. So as long as it's there."

A few interviewees saw the existence of a list of patents as following from the chosen Adoption method. This makes sense, as without any negotiation, clarity is required to be fully presented in the pledge itself as identified by Valz (see section 2.1.1):

"When the adoption strategies are different then yeah, it's understandable why they have to almost serve a list of patents."

6.1.4 Direct Conditions: Duration - The fear of lock in effects

Duration was predominantly rated as important due to negative attitudes towards it. The predominant fear expressed was lock-in effects in that Duration opens up questions regarding what happens after the set duration is reached. Several interviewees stated in strong terms that such a duration was unacceptable, due to a strong suspicion of patent holdup and worries of becoming dependant on another actor:

"There is the risk of like, the free thing, with 2030. There should at least be the possibility to prolong or like, you know, renegotiate or renew the license or the deal. Otherwise, it's really dangerous, I would say, because you invite someone in, take the license, it's for free. And then after a couple of years, you take money for it. And it's actually a trap."

"In general there is a long lead time for qualifying approval for use in vehicles. For us having a license which ends at a certain time would likely be very difficult… It is very hard to see a situation [for adopting a pledge] without a certainty that you could renew it"

"What you cannot do is you implement the technology covered by a patent, of one of those companies and then that license expires. Then you have to negotiate having all invested, having customer commitments and whatsoever. So one thing that doesn't make sense to have for a single license is to have the license somehow expire"

"You only get a limited license until 2030. After that, you owe them a shitload of money. 'So good luck, become a very large company with a lot of revenue. And then we'll come talk to you about how much you owe us'. *So I think anything with a limited duration just doesn't make sense."*

While there were of course deviations from this viewpoint, the negative attitude towards defined Duration was one of the most overwhelmingly common reflections. 11 out of all of the interviewees expressed reflections such as those exemplified above. Those more positive towards a set Duration mostly cited the clarity and honesty which it provided:

"*And I think it's quite honest in having this duration of 2030. Because they're being straightforward and saying* 'okay, yeah, we want to make this technology stick. And you can use this for integration, make it cheaper for adoption. But we're probably going to charge you for something at the later stage'. *So you need to take that into consideration."*

"Tesla does not say how long this patent pledge will last. So, this is still one problem, because you never know, if in five years or tomorrow, they will say, 'okay, patent pledge is not valid anymore'*"*

Other factors were conceded to be more important, as Duration was generally not rated in the top 3, but several still saw Duration as "*a show stopper*". The quotes above illustrate a connection to the concept of switching costs (section 2.2.4). Interviewees feared having to switch from Toyota at the 2030 date at which time they will have sunk costs into the technology. Switching to a new technology platform than Toyota will at that date entail a large investment in both R&D investment and learning costs. As such one can explain the negative attitudes to a timed *duration* as an anticipation of patent holdup and switching costs with a related lock-in effect which arise from the condition.

6.1.5 Pricing - Cash is… not king?

Pricing, as part of both Ehrnsperger's taxonomy as well as the TASC model by Asare et al. has multiple aspects to it to consider. A basic divider is however the dichotomy presented by Ehrnsperger regarding *Free* contra *Below mean* WTP. Interviewees presented three different stances. The first was that free pricing is a vital component of patent pledges and what makes them even potentially interesting, these interviewees generally rated pricing higher than others. 5 interviewees took this stance:

"For Ford's case, it's not free. So why do it?"

"Kind of a promise, the license will be free, but we still have to negotiate. That could have been interesting. So I would have put most trust in that type of approach"

The second stance was that *Free* is a misnomer, and a skeptic view towards anything offered for free. This stance can be aptly expressed by Friedman's quote "*There is no such thing as a free lunch"*. This position was expressed by 2 interviewees:

"I would always go for paid. Everything that is free is toxic. They want to have something back. That's basically it. You're not giving something for free. You're not getting something for free. You will never get something for free. Everybody who is giving something for free, they want to have something back. So actually I would go for [paid], not for free."

"It's like this every time. So if you're looking at online searches, like Google or something else, you have to pay at the end of the day, whatever it is. And if you pay with personal data, it's also a kind of payment. So royalty free does not mean that it is without payment"

A more common stance was however that pricing of course is a vital factor, but so long as the cost is reasonable it is not a major impediment to adoption. These 5 interviewees generally rated pricing as a factor of middling importance:

"The cost could be a showstopper. There is always going to be a certain point for a fee where it is not viable, I do not have a number but you relate that to product cost and price of sale. In that sense the FRAND part makes sense"

"I think also that depends if you recognize that there is really a value in it, and you can also materialize this value in your products with the customer, then I think you should be willing to pay something for it"

"I think that the one I think is easiest to assess is probably pledge 2. Because of the reasons above, of course there is a cost but we can negotiate that"

In general it can be concluded that most interviewees were open to both free and below mean WTP patent pledges. Most did not rate pricing as highly as may be suspected, the predominant position being that you are willing to pay if the technology is valuable. This is especially interesting with regards to previous theory which posits pricing as one of the most important factors (see section 2.2.3.1). It should however be noted that indirect costs may weigh heavily in such an assessment. It may also be that pricing is indeed still important, but the fact that pledges are limited to *below mean WTP* may limit pricing in such a way that it is not as important. It should be noted that it is obviously of higher importance if the pricing is uncapped. If a pledge cost 5 billion dollars to adopt, this would obviously make it the most important factor to disregard it. As such it could be theorized that the pricing factor does not represent a significant obstacle for adoption of patent pledges with the limitation of max cost identified by Ehrnsperger. Another reflection is that there seems to be a connection between pledges that are adopted through negotiation and pledges that are priced. If there is no contact between the parties, it is not really possible to make any royalty payment. If a pledge which is adopted through utilization is made available for a fee, a contact needs to be established

between the parties, in which case it can be questioned whether the pledge is actually adopted through utilization.

6.1.6 Indirect Conditions: Non-Assertion

Regarding the rating of the non-assertion condition a methodological stance was required. As explained in ch. 4.1.1, the Tesla patent pledge, which was the only pledge with this condition confirmed, has an unusually broad non-assertion clause. For purposes of rating factors we decided to disregard this unusual clause and instead present it as a more standardized and narrow non-assertion clause. Other patent pledges such as Google also feature that kind of non-assertion clauses. For the purposes of rating actual conditions, it was thus seen as purposeful to disregard this irregularity in our sample of pledges. Some interviewees were however distinctly familiar with the pledge to such an extent that the exact provision of the Tesla pledge informed their rating. As such, the presentation of results here will separate between "normal" non assertion clauses as rated by the majority of interviewees, and what we have chosen to call Tesla's "Global non-assertion".

Normal Non-assertion

Normal non-assertion such as the clause presented by Google was mostly deemed to be acceptable. It was still given a middling rating by most interviewees due to it having a concrete effect on a pledgee, it would be better if it was not there. However, the prevailing opinion was that while this was the case, a normal non-assertion condition was reasonable and would be less likely to heavily impact assessments of pledge adoption:

"I think those are all reasonable, in my opinion. I mean, if you're going to promise not to sue them, that should not be like immutable, it shouldn't just be there forever, no matter what the other party does to you. You can pledge to help them and the industry generally. But if you want to be a beneficiary of the pledge, you need to behave well too. So that all seems like a reasonable condition to me"

"I mean, it's reasonable. Non assertion is a critical part"

"But this seems fair, this seems fair".

Global Non-assertion

While the decision was made to exclude Tesla's unique non-assertion clause, it still affected the rating of some interviewees and a lot of strong opinions were given regarding it. It was predominantly seen as unacceptable and unreasonable:

"Tesla says that you cannot use your own patent portfolio or should not use it anymore, because this has a high value risk for the company's value. Because you give the signal to the competitors or whoever that you will not use or enforce your own patent portfolio anymore. And this can have a high impact on the stock market price of your company"

"Everybody who has a better patent position, for them using the pledge would be a disadvantage actually."

"This will have a high impact on the value of your own patents, not against the pledgor, but against any third party".

A conclusion which can be drawn is that normal and standardized non-assertion clauses are generally seen as reasonable and acceptable and will have a middling impact on adoption. A more extensive clause such as Teslas on the other hand will likely largely diminish adoption.

6.1.7 Indirect Conditions: No Challenge

The no challenge clauses were mostly assessed similarly to Non-assertion. Most interviewees saw it as a negative, but also something which was reasonable to accept if you were to adopt a pledge:

"No challenge okay, I can understand"

"Because I think this basically, if you have an agreement with someone, you will never challenge the patent of them. Because it makes no sense because you have an agreement".

The new version of the TTBER (Technology Transfer Block Exemption Regulation) does not protect no challenge clauses meaning that they have no specific protection from the regulation (Lawrance 2014). A couple of interviewees saw it as problematic for this reason as well as from a business-ethics perspective:

"But I have a problem with it because from the legal perspective, I think, and even in the SEP space and the antitrust case, it should always be possible for a party to challenge a patent. Because, the PTO they put in five hours of work to check a patent. It's not definitely valid. So it should always be possible to challenge the validity, which should actually be welcomed. So this no challenging is actually problematic for me, to be honest"

"From my legal understanding it should always be possible to have a challenge and no challenge is not really fair".

6.1.8 Reputation

Most interviewees expressed the view that reputation and other inter-company relations were not that important, as is reflected in the ratings. A typical response was merely stating that it is not something which is generally considered:

"So the reputation of the company? Not very important".

Several interviewees however saw it as something which was of relevance, but that it was merely less important than the other specific factors being assessed:
"How do they interact with their licensees, with other customers? and that also gives you a profile of the company and what you're really dealing with. If I see that they first license you something and then goes after you, and there's a lot of lawsuits and anything like that between the licensor and the licensee, that will be a red flag, for sure".

Lastly, a reflection posed by a couple of interviewees was that there existed the opportunity for reputation of an actor to complement the lack of a specific list of patents:
"Reputation could be something because even if you do not look at the patents, actually, you know Toyota has a strong portfolio. Tesla has a good portfolio on its products. So this is also something which deciders may consider".

In general it can however be said that reputation was seen as non-critical. Either it was outside the assessment or it is seen as less important than other factors. Inter-company factors as such seem to have less weight than other factors for adoption, at least when assessing patent pledges.

6.1.9 Others' Utilization

Others' Utilization was our modified version of *industry support* and *competitive pressure* found in the theory of Asare (2016). The answers indicate that it was understood in such a way as to represent these factors. It was however quite clearly the lowest rated with a low deviation. Only 1 interviewee rated it over the middle, indicating its low perceived importance:

"You know, it depends on whose patent pledges, can I go out and discover that there's a lot of people using that IP, and they haven't litigated any of them? That's the kind of things I'd be looking at, right"

"That depends on the specific technology. So for example, if you have a technology which is based on an interface, then it would be good that others also use it so that all customers have the same interfaces. If it is something you want to make a difference to the customer then others use would not not be so good. So that depends really from the technology and what it is used for".

In general, the interviewees who perceived others' utilization to be more important posed it as a "it depends" which led to an overall lower rating from them as well. The second quote is interesting as it relates to the idea of network-based goods and platform economies. In such cases the importance of this specific factor may be increased, and it is possible that in industries which are more platform or network based than the automotive industry it will rate higher. This goes hand in hand with a general reflection posed that the automotive industry is quite traditional and independent:

"The automotive industry, it is very, very traditional, there's not a lot of cooperation, there's not a lot of exchange of ideas. I like to say: every company dies for its own. So therefore, it's like, everybody is doing their own things and trying to be as independent as possible".

The results indicate that *competitive pressure* and *industry support* for a patent pledge are generally not significant reasons for actors in the automotive industry to decide to adopt or not to adopt a pledge.

6.2 Inductively Identified Factors

Both before and during the time when the factors in section 6.1 were rated by the interviewees, they were asked to add and discuss any other factors they could think of. 7 interviewees added and otherwise mentioned such factors that were not part of the factor rating conducted above. Those factors can be summarized by the table below.

Clear conditions	**Maintaining Independence / Avoid lock in**	**External Environment & Industry support**	**Value chain positioning**	**Motivation**
6	2	1	1	1

Table 12. *Inductively identified factors of adoption and the number of interviewees who mentioned it*

Clear conditions was by far the most common factor identified by interviewees which we did not mention. This factor was identified in previous theory in the works of Jacob, but was excluded due to its vagueness. Upon retrospect, this result indicates that the exclusion may have been a mistake. It would have been interesting to gather the opinions of all interviewees. All 6 of those who did mention clear conditions did however rate it. The average rating of the factor by those interviewees was a 2.5, placing it as the on average second most important factor of all considered by those interviewees. The nature and definition of clear conditions by those interviewees was elucidated upon a number of times:

"It must be easy to communicate. The best thing is to go to the board, make a proposal with one sentence, then we recommend to take this pledge, because of that one sentence, and that must be clear and understandable so that the board will follow"

"So for example, in Tesla, we have no imitation. Let's take that as an example. I would have to understand, like what's imitation for them and how we could guarantee that we would not do that."

"The factor of willingness is the risk of the company has to be reduced. It should be clear, the conditions should be clear, like transparent."

The demand for clear conditions seems to be that a pledge should be able to balance between comprehensiveness and simplicity. The interviewees saw that they required comprehensive conditions in order to manage risks, but at the same time required simplicity in order to communicate the value of the pledge. Our results indicate that this balance may be a highly important factor in making a pledge accessible and attractive for automotive industry companies.

The second factor is summarized as *"maintaining independence and avoiding lock in"*. This factor is somewhat connected to certain factors which were assessed directly, such as *Duration* and *Indirect Conditions* but was mentioned here separately as an overarching factor:

"So if there is a patent pledge, where you move to that technology, and for example, it has only a period in the contract where they grant free royalty or something like that. And you have then a continuation of the technology after the end of the contract, then you are locked in and what happens then? So that is something which I think is the most important point you should have in mind, if we're talking about what factors affect the addressee of a patent pledge."

"Our strategy and our policy is to try to develop our own IP portfolio. And taking these as services will make more sense for us, when possible. So if there will be a clause in any pledge that would require the foreground IP to belong to the originating company? That would be like a no go for us, immediately a red light."

As assessed above in ch 5.2.1.2, companies in the automotive industry predominantly are focused on their own IP portfolio and license agreements are rare outside of stick-licensing. This position and overall philosophy makes it an important factor that companies can maintain an independent position and avoid being locked in to another actor's technology. This factor was not directly rated, but both interviewees who mentioned this as a factor rated related factors pertaining to conditions and duration higher than the average rating.

External Environment and Industry Support related more generally to the market as such than the factor rated directly in *others' utilization*. It should be noted however that the same interviewee which mentioned this factor rated *others' utilization* the highest out of any interviewee, illustrating the connection:

"Market landscape. I mean, customer needs, markets, all that, you know, the end customer, what are the trends and so on. And then, of course, the industry forces are also very important. I mean, of course, they rely on each other, but I think industry forces themselves can be one. And the third would be the strategic framework of the company, what it wants to do in 5 years, 10 years. So it is, in a way, a response to both the market and trends and the industry forces".

The factor on its own denotes the entire subsection of External Environment conditions by Ehrnsperger as being particularly vital. It should be noted that the interviewee gave this response in relation to what three factors would be the most important. The external perspective could be viewed as indicative of a standardized risk assessment which in some way is less unique for patent pledges, illustrating that patent pledges as a subset of other technology sharing initiatives can not be wholly separated from those assessments which are ordinarily applied.

One interviewee was of the opinion that the *value chain position* of the pledgor was a vital point. The interviewee, who was a Supplier, noted that it would be much simpler if the pledgor was in the same position in the value chain in order to keep customer relations normalized and stable:

"It's much easier to evaluate if it's a pure competitor of yours compared to if we are somehow a part of a value chain, because then all customer- supplier relationships are in that one. And that's very difficult also to define for somebody who does a pledge. So there is rarely cross-licensing across the value chain and the customer."

Motivation of the pledgor was brought up by one interviewee as an important factor to assess a patent pledge. The view of the interviewee was that in assessing the motivation, one can assess the pledge easier:

"The motivation is important I would say, because, you know, like, when I understand the motivation of a company, I can perhaps better assess also whether this is necessary."

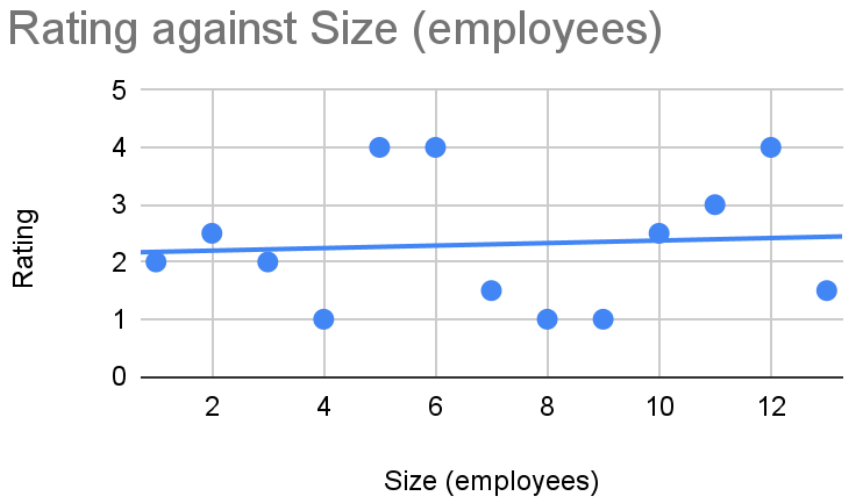
All in all, most interviewee responses directly matched those factors which were on our list. This indicates that the selection of factors was suitable. *Clear Conditions* however occurred often and should not have been excluded by us. The results indicate that this factor could be very important, although the question of how to define it in a concise way which represents the span of what is seen as "clear" remains. This question will be brought up again and analyzed in section 7.3. All other factors were only mentioned by one or two interviewees indicating that they may not be as vital as other factors in general. The factors as identified through theory all had more occurrence. In a larger study the other factors could however be interesting to validate with a larger sample of interviewees.

6.3 Organizational Factors

Asare et al. define 4 organizational factors which may impact technology adoption by firms. *Size, Centralization, Management Support* and *IT readiness*. As mentioned in ch. 3.3.2, *IT readiness* is without relevance for the purpose of this study. Furthermore, *management support* may not be assessed in generalized contexts and as such it can also not be assessed with relation to a setup as such. For this reason, *management support* will also not be assessed. Below, the remaining Organizational factors from Asare et al. will be assessed to investigate if there is any correlation between them and the openness to adopt patent pledges.

6.3.1 Size

Size of organizations can be measured in a great number of ways, including market cap, number of employees, profits etc. The ideal measurement to assess a company's size depends on the specific context and reasoning behind doing the measurement in the first place. The efficiencies of larger companies which Asare et al. connect to the positive correlation between larger size and technology adoption refers to a large firm possessing more *resources*. At the same time, potential negative aspects refer to the possibilities of firms becoming slower and more mechanistic with larger organizational structures. In order to assess the correlation to size in this case, the number of employees for each organization will be assessed. This is assessed to most aptly measure the amount of intellectual resources and R&D capabilities of each firm without depending on specific market results as well as factoring for mechanistic effects due to the assumption that the size of the organizational structure and the amount of bureaucracy it requires is the leading cause of such effects.



Graph 2. *Attitude to patent pledges by size in relation to each other (Larger to the Right)*

The graph above plots the general rating of patent pledges in relation to the number of employees of each firm with a trendline. The number of employees have been assessed based on each company's latest public statement regarding it. As can be seen there is little correlation between the size and a general positive/negative attitude. This is illustrated by the Pearson Correlation Coefficient, which is 0,12. This indicates that there is only a very weak correlation, so low that it may be disregarded. In general a larger company should be more open to adopting new technology according to Asare et al. This seeming difference from theory may be due to a number of reasons. It may be due to the relatively low amount of interviewees which makes it difficult to assess trends. It may also be due to the fact that the interviewees are not the companies as such but individuals within them, which may mean that their attitude differs from the practical realities of their employer. It may also mean that while larger actors may be more open to adopting technologies in general, the manner of which it is acquired, such as through a patent pledge, is assessed similarly by both larger and smaller actors.

It can however be seen that the 4 largest organizations did have a slightly more positive overall attitude than the 4 smallest. The interviewees were also split on the subject when assessing what size companies most benefit from the pledge:

"The smaller the better, at some point the business case starts to make sense of taking one of these pledges against the cost that is implied in seeking a license, having all the

administrative stuff to do. If you don't have an IP counsel in the law department in-house, or anything like that, the cost that you need to manage that risk, at some point exceed the risk itself"

"And the only companies that really will benefit, unfortunately, are the big companies. Because little companies don't care about IP. They're focused on getting their product out the door. And the last thing on their mind is a patent suit. And the reality is that big companies with big assets, don't sue little companies who don't make any money".

It may be the case that the ideal recipient of a patent pledge is SMEs, of which we had none in our interviews. The effect of size on adoption must be said to also be split from those interviewees who theorized regarding this. This largely goes hand in hand with previous theory as referenced by Asare, in which some claim that Size is an impediment to technology adoption instead of having a positive relation as claimed by Asare.

In conclusion it must be stated that our interviews indicate that Size may well have an impact on adoption, but that the statistics do not support such a conclusion.

6.3.2 Centralization

Centralization as defined in Asare et al. refers to a limited scope of actors within the organization making a large amount of decisions. In general a more *Centralized* organization should be assumed to be less likely to be open to technology adoption with reference to Asare et al.. In order to assess this factor, the interviewees were asked how decision-making regarding technology adoption worked within their organization. From these answers, 2 different main ways of decision making were identified. 6 stated that such decisions were made within the IP department, often involving a head or boss of the IP department. 5 stated that such decisions are assessed by the IP department, but that ultimate decision-making is made by the board of directors or on the C-level. Our assessment is that such organizations which make decisions on the board or C-level must be assessed to be more centralized. According to Asare et al. the reason centralization has a negative impact is due to a higher level of detail knowledge in lower management. This must be assessed to be the case regarding technology adoption as the IP department has more detailed knowledge about the specific technologies and terms than they can report up in the organization. In order to assess

whether the centralization made a difference on attitude towards patent pledges, a two-sample t-test was conducted on the two groups. There was a moderately significant difference in the comparison between the more (M=1.9, SD=0.75) and less (M=2.9, SD=1.2) centralized organizations; t(10)=1.63, p=0.13. Those actors who were less centralized and thus had more decision making power were generally more positively inclined towards patent pledges than those who were more centralized. In fact, the less centralized trend is close towards having a positive assessment of patent pledges as a whole, only being 0,1 under the middle point of 3.0. All those who had an overall positive opinion of patent pledges are in the group which are less centralized. None in the group that was more centralized had a positive opinion of patent pledges, trending towards below 2. The p-value of 0,13 is somewhat above standardized alpha values of 0,05 and 0,10, and as such the null hypothesis can not fully be rejected while being concerned with strict academic results. It is however close enough that we suggest that there may be value to further investigate this correlation in future studies in the area of patent pledges with a larger sample size.

Based on the data presented above it seems that people in organizations which are less centralized overall have a more positive opinion of patent pledges in general or at the very least see less issues in utilizing such pledges.

7. Consolidated Analysis

Analysis regarding specific questions and chapters has been conducted in relevant chapters in the chapter above. This chapter serves to analyze some points and emerging topics that were identified through the interviews and through viewing the above chapter in aggregate as a consolidated whole. As such, this chapter may be seen as an analysis of the entirety, whereas the above was an analysis of the parts.

7.1 Taxonomies

As mentioned before, the Tesla pledge and the Toyota pledge are classified in the same way in Ehrnsperger's taxonomy (see section 4.4). The Ford pledge and the Toyota pledge are classified as each other's opposites, despite them being rather similar in practice. This is due to Ehrnsperger's taxonomy not covering the way that the pledge is adopted. As this changes the way that the pledge functions in practice, it can be seen as a rather important dimension when classifying a patent pledge. It also changes the nature of the pledge, as no contact is required between the parties when it comes to pledges which are adopted through utilization of the patents in question. That means that all conditions for using the pledge must be stated in the pledge document itself. This creates a need for this type of patent pledge to be longer and more detailed than patent pledges which are adopted through negotiations.

Another fact worth considering is that *Adoption* was assessed to be second most important among the factors discussed in chapter 6. This *pledge specific factor* is one which was identified by Valz and which is not present in Ehrnsperger's taxonomy. The fact that this basic dividing factor was seen by practitioners to hold higher significance than e.g. pricing, which is part of Ehrnsperger's taxonomy, presents a potential weakness in it. Nickerson notes that a useful taxonomy is *explanatory*, meaning that while it does not present each and every facet of the research object, it provides a useful explanation to achieve understanding of the object (Nickerson et al. 2013). As was discussed under section 6.1.2 which regards the *Adoption* factor, the interviewees also identified that the *Adoption* factor will have a large bearing on the rest of the *pledge specific characteristics* as presented in Ehrnsperger's Taxonomy. Furthermore, a reflection of the interviewees was that Toyota and Ford were similar and that Tesla was the odd one out and differs significantly (see section 4.4). This is remarkable based on the fact that Tesla and Toyota fall under the same category in Ehrnsperger's taxonomy as

conditional, public, free. Meanwhile, Ford is *non-conditional, semi-public, priced.* In other words, the exact full opposite of those two pledges as it differs in each component of the taxonomy. The fact that Toyota and Ford, polar opposites, were seen to be more related than Tesla and Toyota, the same category of pledge, indicates that *Adoption* is a far more significant characteristic of patent pledges in practice than has previously been identified. We posit that the *Adoption* criteria may be more suitable from an *explanatory* point of view than other criteria included by Ehrnsperger.

7.2 What makes a patent pledge?

Something else worth noting is that several interviewees did not see Ford's offer as a patent pledge (see section 5.3.2). Rather, it was characterized as "normal commercial activity" or a "traditional licensing program", as Ford makes patents available for a fee. This comment was recurring when it comes to the Ford pledge, but was not mentioned in relation to the other pledges.

On the other hand, not every interviewee had this perspective on Ford's pledge. One interviewee thought that it should still be seen as a patent pledge, since Ford promises to do something that they are not required to do by law, and they are extending the offer to everyone (see section 5.3.2).

Ehrnsperger defines a pledge through the degrees of openness exhibited by the offer. Closing the pledge to few recipients means that a pledge is more of a license than a pledge in his taxonomy. Interviewees also expressed similar thoughts regarding the concept, but seemingly pushed harder on certain aspects of Ehrnsperger's taxonomy being integral for the pledge. From the discussion held above regarding Tesla standing out, it is apparent that the *Adoption: Utilization* factor is seen as a part of what may define pledges. However, Toyota did not face the same scrutiny as Ford, indicating that *free pricing* may also be seen as a factor through which actors in the automotive industry interpret pledges. As discussed in section 6.1.5, it seems difficult to create a pledge utilizing *Adoption: Utilization* which is also paid. The opposite is not however true, in that Toyota has created a pledge which utilizes *Adoption: Negotiation* which is free. As such, the *free* part in Ehrnsperger's taxonomy can be assessed to be integral to the overall understanding of patent pledges, and may more commonly be understood as pledges.

To sum up, there are different perspectives on what makes a patent pledge a patent pledge. It can however be concluded that there are indications that patents need to be offered for free for a statement to be seen as a patent pledge by everyone in the industry.

7.3 Can strengths of different pledges be combined?

When assessing the full results of section 6, an interesting trend emerges. Several *pledge specific adoption factors* are rated above the *general adoption factors*. The most interesting one is doubtlessly *Adoption*, which has been covered above. When assessing the results from a larger perspective however, a couple of key subjects emerge.

The first subject relates to *simplicity*. The value of e.g. the Tesla pledge was often stated to be in the simplicity of it and in that it lowered or even removed transaction cost (see section 5.3.1). At the same time, the legal uncertainty of the construct was a heavily recurring theme in both a dislike for the Tesla pledge, as well as *Utilization*-patent pledges in general. Even those actors who were positively inclined to pledges brought up the topic (see section 5.2.11). These reasonings often lead interviewees to prefer the negotiation-based form of *Adoption*. Indeed, these two options, *negotiation* and *utilization,* seem to be the adoption forms which occur in the automotive industry, but it is worth questioning whether the ideal alternative is somewhere in the middle. The current dichotomy of negotiation and utilization puts *simplicity* against *clarity* in a manner which does not balance the two, but rather which heavily prioritizes one at the cost of the other. One could question if the main reason for *why* interviewees so heavily preferred *negotiation* was because of a *negotiation process* or *only to reduce legal uncertainty.* The interviewees' answers indeed seem to support this conclusion (see section 6.1.2). In that case, what is important is not the “negotiation” but merely having a written, signed contract. This in itself can occur without negotiation processes, and often occurs concerning software licensing through “clickwrap”, in which a licensee merely accepts or declines a prewritten agreement given by the licensor. While it is likely that companies will prefer a more clear and auditable manner of signing contracts concerning important IP, there may be a middle ground to be found in which simplicity can be balanced against certainty without fully diminishing each other.

The discussion posed in this section relates strongly to Contreras’ design principle of

simplicity and nearby concepts by other authors (as covered in section 2.1.2). Contreras explained the design principle as creating a legal structure that is simple, intuitive, and understandable to non-lawyers (Contreras 2021). Our results indicate that within this definition of a seemingly simple principle lies a strain and a balance that may be far more complicated and central to the issue of patent pledges at large. Simplicity according to Contreras is both what we call *simplicity* and *clarity*. The results of the interviews regarding the Tesla pledge illustrates that simplicity does not always mean that something is clear. The example of EULAs as posed above in section 4.1, also supports a view of two different concepts rather than one which is contained within the principle. Due to the high impetus of the interviews of concepts of *Legal uncertainty*, and the *Adoption* factor overall, one can deduce that this may be one of the most important design principles expressed by Contreras from a practical perspective, and one of the most difficult ones to achieve.

7.4 Closed innovation

It is also worth noting that some reasoning of the interviewees implies that the logic in the automotive industry is very different from, and basically contradicts, the open innovation logic. Instead of utilizing external ideas to create value, it was mentioned that most automotive suppliers want to produce things that they have invented on their own. Rather than being open to use the technology of other companies, the automotive industry was characterized as not having "collaboration on their radar" (see section 5.2.1.2). This kind of logic might also contribute to the fact that patent pledges are not so well received in the automotive industry. Whereas patent pledges, using Chesborough's words, indeed seem to seek to "*use purposive outflows of knowledge to expand the markets for external use of innovation"*, there seems to lack actors who seek to "*use purposive inflows of knowledge to accelerate internal innovation*". This could in turn be related to the trend of shorter experience in the industry having a moderate correlation with more positive attitudes of pledges (see section 5.1). This is also related to the fact that several interviewees wanted to ensure that everything following the pledge could be managed in-house (see section 6.1.1). A decision to utilize a pledge would be based on the internal competencies of the company. Someone within the company needs to be able to manage the technology. The technology has to be very relevant to the business of the company, for them even to start considering taking the pledge. This indicates that a patent pledge does not push companies to get access to technology that they would not be interested in beforehand.

A key factor when assessing patent pledges at large is the factor of Network effects. This is often cited in academia as an important aspect of patent pledges in the works of Ehrnsperger, Contreras, Vertinsky etc. An expectation when assessing this space was thus that network effects would be an emerging theme when assessing the concept. No such comments however occurred at scale. When assessing the interviews, network effects and related concepts such as technology platforms and compatibility emerged only a few times in a tangential manner. This is interesting as the end product, a car, is definitely under the provision of both Indirect Network effects and Type-3 network effects as defined by Katz & Shapiro (see section 2.2.4). Suppliers' technology compatibility with leading technology designs directly impacts the amount of parts which can be sold. Furthermore, the aftermarket of cars and the provisioning of different kinds of service is a legal requirement in most nations, creating a legally stated demand for the application of aftermarket services. It is thus slightly surprising that it was not a more common theme, as that could reasonably be predicted both from theory and the practice of the market. While Network effects were not directly brought up in the interviews, they were heavily expected to be an emerging theme. Why the interviews did not touch too much on the topic may have several reasons. One possibility is that it is not as core as other things concerned. Another is that the interviews would touch on it more if more time was available. Nonetheless, the lack of data on the subject may in this case be as interesting as any presence of data would.

8. Conclusion

The purpose of this thesis was to assess the attitudes to patent pledges and which factors may influence adoption of such pledges in the automotive industry. This was achieved through answering three sub-questions.

8.1 Conclusion to SRQ1

The first sub-question was about what characterizes the patent pledges used in the automotive industry. The conclusion was that three different patent pledges have been made in the automotive industry, by Tesla, Ford and Toyota. They were found to have rather different characteristics. The pledges were analyzed in relation to theoretical frameworks developed by previous authors, and modified by the authors of this thesis.

The Tesla pledge was characterized as an open model. It is a type of patent pledge which has *Non-assertion* of patents at its core, as the pledging company promised not to initiate lawsuits for infringing one of patents covered by the pledge. What makes the Tesla pledge "open" in relation to the other pledges is that it is adopted by a pledgee through *Utilization.* That means that a company that wants to accept the patent pledge does so by starting to use the patented technology. This means that no contact is required between Tesla and the pledgees.

When it comes to the content of the Tesla pledge it has more *Specificity* compared with the other pledges in the industry. Unlike the other pledges, it contains a list of the 361 specific patents that are included in the pledge, not just a technology area. Apart from the way that the Tesla pledge is adopted, two other reasons why it was characterized as an open model had to do with *Pricing* and *Availability.* While the patents in some other pledges are made available for a fee, Tesla's can be used for free. It is also made available to the public, not just to large segments of certain markets. However, there are certain *Conditions* associated with the use of the Tesla pledge, both direct and indirect. The direct condition on the use of the patents entails that utilization has to be through activity relating to electric vehicles or related equipment. The indirect condition means that actors who use the pledge need to act in "good faith". Good faith is defined by Tesla in a rather extensive way, where the pledgee or its related or

affiliated companies is not allowed to assert any intellectual property rights against Tesla, assert any patents related to electric vehicles against any third party, challenge any Tesla patent, or make any imitations of Tesla products, to still be covered by the patent pledge.

The Ford pledge was characterized as a licensing model. It is a type of patent pledge which has *FRAND licensing* of patents at its core, as it makes patents available for a fee. Another reason that it is characterized as a licensing model is that it is adopted through a *Negotiation* with Ford, and it thus looks more like a traditional licensing program.

When it comes to *Specificity,* the Ford pledge does not contain any list of patents, but it is mentioned in the pledge that the 650 granted patents relate to the technology area of electrified vehicles. When it comes to *Pricing,* it has already been mentioned that patents are made available for a fee. The *Availability* of the pledge is limited, as Ford will only license patents to competitive automakers. Apart from that, the pledge does not contain any *Conditions*, but it can be reasonably assumed that such conditions will emerge once the pledgee contacts Ford and indicates their interest in the pledge.

The Toyota pledge was characterized as a middle ground between the Tesla pledge and the Ford pledge. It is a type of commitment which entails *Royalty-free licensing.* That means that the pledge is adopted through a *Negotiation* and that the pledgee will get a contract in their hand, but that it is free when it comes to *Pricing.*

Regarding *Specificity,* the Toyota pledge does not contain any list of patents, but states that the nearly 24 000 patents concern the technology areas of fuel cell vehicles and hybrid technology. When it comes to *Availability,* Toyota makes the patents available to the unrestricted public. The Toyota pledge has one direct condition, limited duration. The duration of the pledge is limited in the sense that the grant period will last through the end of 2030. The pledge does not mention any more conditions, but states that specific terms and conditions will be discussed once an interested party contacts Toyota.

Our research has featured the Adoption characteristic, which is not present in Ehrnsperger's taxonomy, the most extensive taxonomy in the field. Our findings suggest that this characteristic may be vital to assess and understand patent pledges as a concept and their efficiency in a practical sense. Furthermore, we question the practical existence of

non-conditional pledges, as those pledges classified as such can be assumed to actually have several conditions in practice. It was also found that such patent pledges which are *priced* and adopted through *Negotiation*, such as the Ford pledge, are often not understood as patent pledges at all from the practical sense as it closely mirrors a normal licensing program. This in itself does not mean that such pledges should be excluded from the definition, but illustrates that practical and theoretical understanding of patent pledges differ to a large degree.

8.2 Conclusion to SRQ2

The second sub-question was about analyzing the perceptions of patent pledges, their impact, and the motivations behind them, among actors in the automotive industry. The conclusion was achieved through interviews with actors in the industry.

The general perceptions of patent pledges in the automotive industry was found to be predominantly negative. Out of the 13 interviewees, only 3 were found to hold predominantly positive attitudes. The data suggest that a factor which impacts this may be the *years of experience in IP-work in the industry*, which exhibited a moderate correlation with the overall attitude. Prior experience with patent pledges were not found to have a correlation with any degree of significance either way. The main drivers of negative attitudes seem to be: *legal uncertainty, the traditional nature of the industry, problematic effects across the supply chain,* and *the perception that patent pledges were predominantly PR statements.* The main drivers of positive attitudes seem to be: *legal and market requirements of sustainable transition* and *the traditional nature of the market as something which was desirable to change*. Furthermore, only 2 actors found patent pledges to have had any impact on the industry, and then only from a PR perspective, further indicating a generally negative attitude to the concept and its functionality.

Regarding the specific pledges in the automotive industry, it was found that no one pledge seemed to be generally preferable over the others. The results seem to suggest that the *size* of the company seems to impact which pledge is preferred, with larger actors generally preferring the Tesla pledge and strongly disliking the Ford pledge. The Tesla pledge was generally positively regarded for its simplicity, but negatively regarded for its legal uncertainty. The Toyota pledge was generally positively regarded for constituting a middle

ground, but strongly negatively regarded for its time limited duration. The Ford pledge was generally positively regarded for its clarity, but negatively regarded due to it being found to not be a patent pledge and merely constituting normal business.

The motivations for conducting a patent pledge were interpreted in several ways. 11 interviews cited *Reputation & PR* as a motive. The same amount also cited *Technology diffusion*. 9 interviewees cited *promoting additional monetization*. 5 interviewees cited *decreasing patent threats* as a main motive. A couple of other motives were mentioned by a couple of the interviewees, but these express the largest groups of motives found. This derogates from previous research on the topic by Ehrnsperger, primarily regarding the prevalence of *PR* and *monetization* as motives. As such there are strong indications that actors in the automotive industry are skeptical towards the idea that these pledges are made for altruistic or philanthropic reasons as suggested by some theory.

8.3 Conclusion to SRQ3

The third sub-question was about how various characteristics of a patent pledge and other factors influence the decision-making of actors in the automotive industry regarding the adoption of pledges. The conclusion was achieved through the aforementioned interviews and through asking the interviewees to rate several factors based on importance and comment on it, leading to both qualitative and quantitative data being collected.

	Average Rating (1-9)
Technology	1,44
Adoption	3,44
List of Patents	4,22
Duration	4,56
Pricing	4,89
Non Assertion	5
No challenge	5,33
Reputation	6,44
Others' Utilization	7,44

Table 13. *Factors under study rated by importance in the interviews (see Table 11)*

The table suggests that the aspects of the specific *Technology* as well as the *Adoption* process of the pledge are the two most important factors in such decision-making. Conversely, the *Reputation* of the pledgor and the *Utilization of other actors* were found to be the least important. The middle 5 factors have significantly less internal average difference, meaning that their internal ordering is less conclusive. However, it was found that actors were generally positive to the existence of a concrete *list of patents* and negative to a set *duration* within the lifespan of the patents. *Pricing* was mostly found to be less important, with most actors being willing to pay a fee and not finding that "free" pledges would be significantly more attractive. *Non-assertion* and *no challenge* constitute the *Conditions* under study. It was found that most actors consider them fair if applied and written in a standard manner.

We also question our own created dichotomy within the *Adoption* factor of *negotiation - utilization*. From a practical perspective it seems that several middle-grounds and other alternatives may be possible and could be found to be more attractive to actors in the industry, due to creating a more proportional balance between the interests of *simplicity* and *clarity*. For the future research of patent pledges, it may be interesting to research such alternatives.

Beyond the table presented above it was inductively found that *clear conditions* may be a vital factor. Furthermore, *maintaining independence, value chain position of the pledgor* and the *motivation of the pledgor*, may be factors which have some effect upon adoption decisions, although this can not be stated authoritatively. The factor of *size* was not found to have any correlation with more or less positive attitudes to patent pledges. However, our results indicate that interviewees with less centralized decision-making may be more positive to patent pledges. Although the test failed to reject the null-hypothesis, it may be interesting for future research to consider.

References

Alexy, O., West, J., Klapper, H., & Reitzig, M. (2018). *Surrendering control to gain advantage: Reconciling openness and the resource‐based view of the firm.* Strategic Management Journal, 39(6), 1704-1727.

Asare, A. K., Brashear-Alejandro, T. G., & Kang, J. (2016). *B2B technology adoption in customer driven supply chains.* Journal of Business & Industrial Marketing.

Asay, C. D. (2016). *The informational value of patents.* Berkeley Tech. LJ, 31, 259.

Bagozzi, R. P. (2007). *The legacy of the technology acceptance model and a proposal for a paradigm shift*. Journal of the association for information systems, 8(4), 3.

Boudreau, K. (2010). *Open platform strategies and innovation: Granting access vs. devolving control.* Management science, 56(10), 1849-1872.

Bell, E., Bryman, A., & Harley, B. (2019). *Business research methods.* Oxford University Press.

Chesbrough, H. W. (2007). *Why companies should have open business models.* MIT Sloan management review.

Chesbrough, H. W., Vanhaverbeke, W., & West, J. (2008). *Open innovation: Researching a new paradigm*. Oxford University Press.

Cipher (2019). *Cipher Report on Portfolio Optimisation.* IAM Media.

Contreras, J. L. (2015). *Patent pledges.* Ariz. St. LJ, 47, 543.

Contreras, J. L. (2018). *The Evolving Patent Pledge Landscape.* Centre for International Governance Innovation (CIGI) Paper Series, (166).

Contreras, J. L., Hall, B. H., & Helmers, C. (2019). *Pledging patents for the public good: rise and fall of the eco-patent commons.* Hous. L. Rev., 57, 61.

Contreras, J. L. (2021). *The Open COVID Pledge: Design, Implementation and Preliminary Assessment of an Intellectual Property Commons*. Utah L. Rev., 833.

Creswell, J. W., Klassen, A. C., Plano Clark, V. L., & Smith, K. C. (2011). *Best practices for mixed methods research in the health sciences*. Bethesda (Maryland): National Institutes of Health, 2013, 541-545.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). *User acceptance of computer technology: A comparison of two theoretical models.* Management science, 35(8), 982-1003.

Doty, D. H., & Glick, W. H. (1994). *Typologies as a unique form of theory building: Toward improved understanding and modeling*. Academy of management review, 19(2), 230-251.

Economides, N. (1996). *The economics of networks. International journal of industrial organization*, 14(6), 673-699.

Ehlers, C. (2018, June). *Mobility of the future–connected, autonomous, shared, electric.* In Proceedings of the 30th International AVL Conference, Engine Environment, Graz, Austria (pp. 7-8).

Ehrnsperger, J. (2021). *Open Intellectual Property Strategies for Emerging Technologies-An Exploratory, Mixed-Method Investigation of Patent Pledges* (Doctoral dissertation, University of Cambridge).

Farrell, J., & Klemperer, P. (2007). *Coordination and lock-in: Competition with switching costs and network effects*. Handbook of industrial organization, 3, 1967-2072.

Ford. (2015). *Ford opens portfolio of patented technologies to competitors to accelerate industry-wide electrified vehicle development.* https://media.ford.com/content/fordmedia/fna/us/en/news/2015/05/28/ford-opens-portfolio-of-patented-technologies-to-competitors-to-.html

Friedman, M. (1975), *There's No Such Thing as a Free Lunch*, Open Court Publishing Company.

Gal, M. S., & Rubinfeld, D. L. (2016). *The hidden costs of free goods: Implications for antitrust enforcement.* Antitrust Law Journal, 80(3), 521-562.

Granstrand, O. (1999). *The economics and management of intellectual property: Towards intellectual capitalism.* Edward Elgar.

Hall, B. H., & Khan, B. (2003). *Adoption of new technology.* NBER Working Paper No. 9730.

Heidbrink, J. (2019). *Grundläggande fordrings- och skuldebrevsrätt.* Studentlitteratur.

Jacob, M. (2017). *Best practices for making patent pledges*. In Patent Pledges (pp. 317-322). Edward Elgar Publishing.

Katz, M. L., & Shapiro, C. (1985). *Network externalities, competition, and compatibility.* The American economic review, 75(3), 424-440.

Katz, M. L., & Shapiro, C. (1986). *Technology adoption in the presence of network externalities*. Journal of political economy, 94(4), 822-841.

Katz, M. L., & Shapiro, C. (1994). *Systems competition and network effects.* Journal of economic perspectives, 8(2), 93-115.

Lampe, R., & Moser, P. (2016). *Patent pools, competition, and innovation—evidence from 20 US industries under the new deal*. The Journal of Law, Economics, and Organization, 32(1), 1-36.

Lawrance, S. (2014). *The competition law treatment of no-challenge clauses in licence agreements: an unfortunate revolution?*. Journal of Intellectual Property Law & Practice, 9(10), 802-811.

Maggiolino, M., & Montagnani, M. L. (2017). *Open innovation and patent pledges.* In Patent Pledges (pp. 248-259). Edward Elgar Publishing.

Moore, G. A. (1991). *Crossing the Chasm: Marketing and Selling High-Tech Goods to Mainstream Customers.* Harper Business Essentials.

Musk, E. (2014). *All our patent are belong to you*. Tesla. https://www.tesla.com/blog/all-our-patent-are-belong-you

Nickerson, N.C. Varshney, U. Muntermann, J. (2013). *A method for taxonomy development and its application in information systems*. European Journal of Information Systems

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). *Platform revolution: How networked markets are transforming the economy and how to make them work for you.* WW Norton & Company

Patel A. (2021). *Why the auto sector is heading for an IP reckoning*. IAM Media. https://www.iam-media.com/article/why-the-auto-sector-headed-ip-reckoning

Pick, D., & Eisend, M. (2014). *Buyers' perceived switching costs and switching: a meta-analytic assessment of their antecedents.* Journal of the Academy of Marketing Science, 42, 186-204.

Porter, M. E. (2001). *The value chain and competitive advantage. Understanding business processes*, 2, 50-66.

Premkumar, G., & Ramamurthy, K. (1995). *The role of interorganizational and organizational factors on the decision mode for adoption of interorganizational systems.* Decision sciences, 26(3), 303-336.

Püschel, J., Afonso Mazzon, J., & Mauro C. Hernandez, J. (2010). *Mobile banking: proposition of an integrated adoption intention framework.* International Journal of bank marketing, 28(5), 389-409.

Rassenfosse, G. de, & Palangkaraya, A. (2023). *Do patent pledges accelerate innovation?*. Research Policy, 52(5), 104745.

Rogers, E. M. (1962). *Diffusion of innovations*. Free Press.

Runesson, E. M. (2014). *Licens till patent och företagshemligheter i avtals- och kontraktsrätten*. Norstedts juridik.

Shapiro, C., & Varian, H. R. (1999). *Information rules: A strategic guide to the network economy.* Harvard Business Press.

Schilling, M. A. (2016). *Strategic Management of Technological Innovation*. McGraw-Hill Education.

Schultz, J., & Urban, J. M. (2012). *Protecting open innovation: The defensive patent license as a new approach to patent threats, transaction costs, and tactical disarmament.* Harv. JL & Tech., 26, 1.

Searle, J. R. (2007). *The construction of Social Reality*. Free Press.

Seymour, L., Makanya, W., & Berrangé, S. (2007). *End-users' acceptance of enterprise resource planning systems: An investigation of antecedents.* In Proceedings of the 6th annual ISOnEworld conference (pp. 1-22).

Shy, O. (2001). *The economics of network industries*. Cambridge university press.

Sia, C. L., Teo, H. H., Tan, B. C., & Wei, K. K. (2004). *Effects of environmental uncertainty on organizational intention to adopt distributed work arrangements*. IEEE Transactions on Engineering Management, 51(3), 253-267.

St. Laurent, A. M. (2004). *Understanding open source and free software licensing: guide to navigating licensing issues in existing & new software*. " O'Reilly Media, Inc.".

Tesla. (2015). *Patent Pledge*. https://www.tesla.com/legal/additional-resources#patent-pledge

Tian Xie, F., & Johnston, W. J. (2004). *Strategic alliances: incorporating the impact of e‐business technological innovations*. Journal of Business & Industrial Marketing, 19(3), 208-222.

Toyota. (2015). *Toyota Opens the Door and Invites the Industry to the Hydrogen Future.* https://pressroom.toyota.com/toyota-fuel-cell-patents-ces-2015/

Toyota (I). (2019). *Toyota Promotes Global Vehicle Electrification by Providing Nearly 24,000 Licenses Royalty-Free.* https://global.toyota/en/newsroom/corporate/27512455.html

Toyota (II). (2019). *Toyota Promotes Global Vehicle Electrification by Providing Nearly 24,000 Licenses Royalty-Free.* https://global.toyota/en/mobility/case/patents2030.html

Valz, D. R. (2017). *Unilateral patent pledges: motivations and key principles*. In Patent Pledges (pp. 37-55). Edward Elgar Publishing.

Venkatesh, V., & Davis, F. D. (2000). *A theoretical extension of the technology acceptance model: Four longitudinal field studies.* Management science, 46(2), 186-204.

Vertinsky, L. (2017). *Hidden costs of free patents.* Ohio St. LJ, 78, 1379.

Vu, S. (2015). *Pledging patents effectively: copyright and open source as a framework for patent pledges.* Colo. Tech. LJ, 14, 437.

Wen, W., Ceccagnoli, M., & Forman, C. (2016). *Opening up intellectual property strategy: Implications for open source software entry by start-up firms.* Management Science, 62(9), 2668-2691.

Zhang, C., & Dhaliwal, J. (2009). *An investigation of resource-based and institutional theoretic factors in technology adoption for operations and supply chain management.* International Journal of Production Economics, 120(1), 252-269.

Ziegler, N., Gassmann, O., & Friesike, S. (2014). *Why do firms give away their patents for free?*. World Patent Information, 37, 19-25.

Appendix - Interview guide

Note: The figures as presented herein were presented to the interviewees for the purposes of structuring conversation to revolve around them. Each one is fully the work of the authors.

SRQ 1 & SRQ 2: *Characteristics and attitudes, impact, motives*

General

1. **How do you understand the concept of patent pledges?**
   Provide our definition
   "Voluntary commitments by patent holders to limit the enforcement or other exploitation of their patents. They are made to the public at large, or at least to large segments of certain markets."

Experience

2. **Do you have any personal experience of working with patent pledges?**

3. **How often are patent pledges discussed within your organization? Weekly, Monthly, Yearly, or even less?**

4. **Who is discussing patent pledges within your organization and in what contexts?**

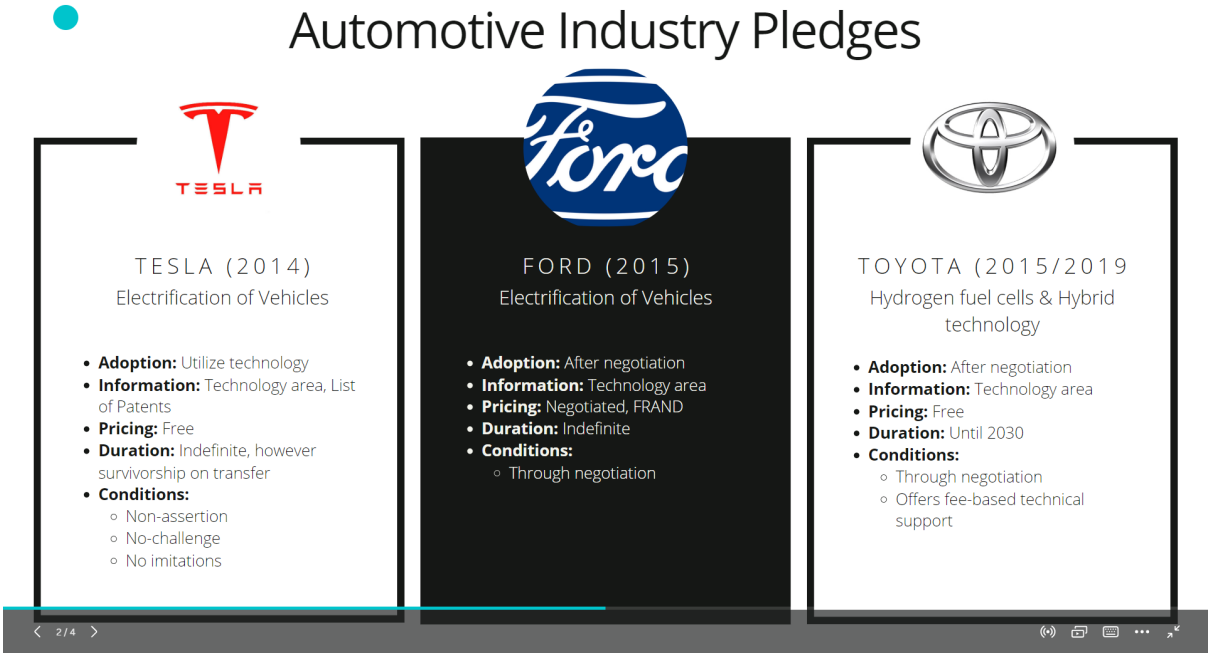
5. **How does decision making regarding licensing or acquiring patents work in your organization? Would it be similar if you decided to adopt a patent pledge?**

6. **If someone in your organization would like to use a patent pledge, do you think it would be difficult to get such a decision approved?**

7. **On a scale of 1-5 where 5 is "very positive" and 1 is "very negative" could you describe your general attitude to patent pledges?**
   1 Very Negative
   2
   3
   4
   5 Very Positive
   Comment:

8. **Which patent pledges are you familiar with in the automotive industry?**

9. **We have identified these: [slide]**
   What do you think of them specifically? Do you think one is better/worse? Why?



Attitudes

10. **Is there anything specific that would make you hesitant about patent pledges?**

11. **What do you think are the most important reasons that companies make patent pledges?**

Utilization

12. **Have any of the pledges impacted the business of your company to your knowledge? Why/why not?**

13. **Do you think that any of the pledges have impacted the automotive industry as a whole?**

14. **In what situation would you be willing to adopt a patent pledge?**

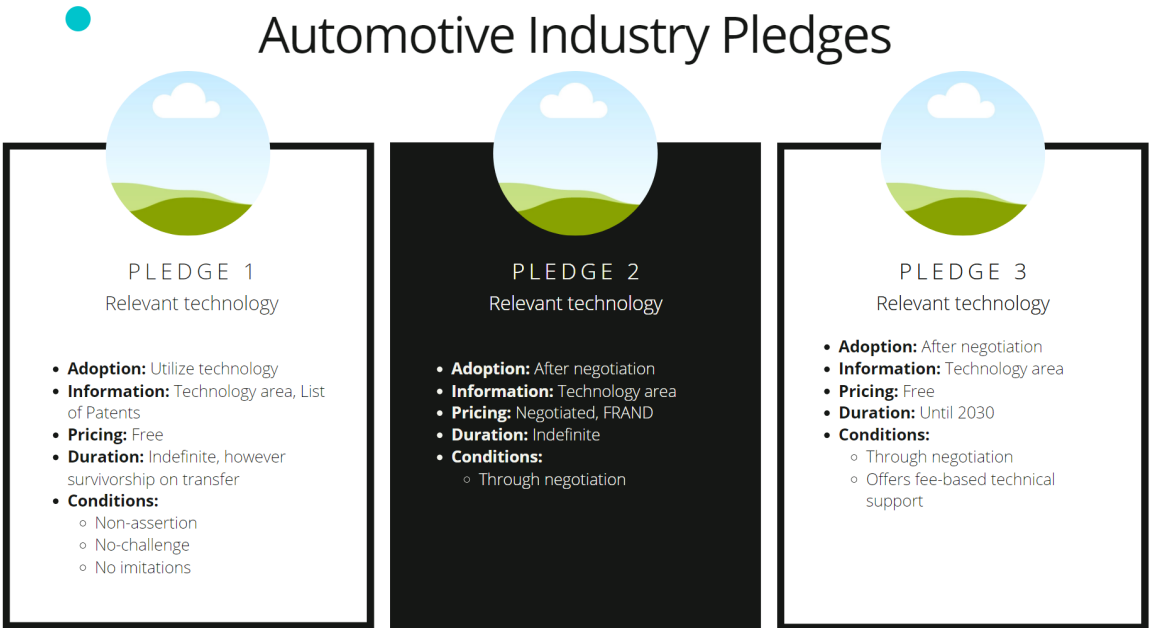
15. **More specifically, how would you use it in that case? Is there any way you would not be willing to use it?**

16. **Do you see any situations where it would be better to adopt a patent pledge rather than getting a "normal" license or sharing technology in some other way?**

SRQ 3: *What factors affect the willingness of companies in the automotive industry to adopt patent pledges?*

17. **Which factors would be most important to you when deciding whether to adopt a pledge? Top three?**

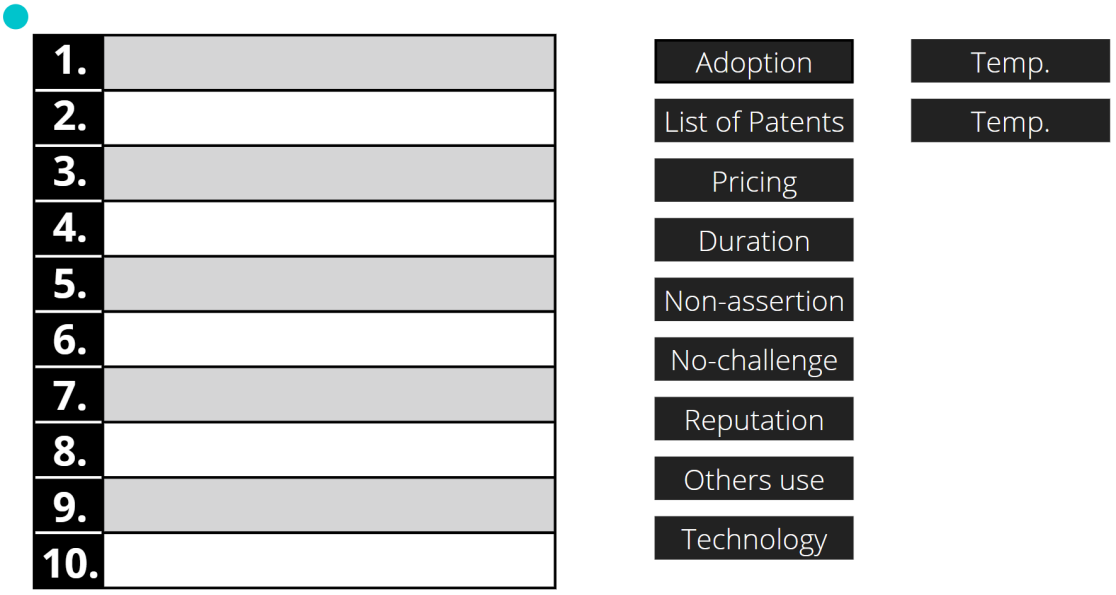
18. **Let's come back to the three pledges mentioned earlier on. If we remove the pledging company and assume that the technology is relevant for you, does that change your opinion? [slide]**



From here we will base our questions on the answers of the interviewee. They will be made to choose which one they prefer/think is better, and we will ask their reasoning. After that we will systematically change the factors below and ask if that changes their opinion and ask about their reasoning. We will complement that with follow-up questions based on their actions such as "since you changed here, would it be fair to say that X is more important than Y and Z?"

19. **Assuming that the technology is the same, and that the specific company is not a factor, is there one of these layouts that you would choose before the others?**

20. **Rate these factors [slide]**



Factors rated in relation to each other based on importance to get solid numbers. Will also assess other factors mentioned by interviewee which we have not identified beforehand (Temp.)

21. The interview is moving towards its end now. Is there anything else about patent pledges that we have not covered that you would still like to add or discuss?

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