



Strategic patenting in Product-Platform industries

About 'Mad Dogs' that fight to become the leader...

Abstract

This paper researches firm and industry factors that impact firm patent strategy, by studying literature, and uses these factors to develop a decision-making framework for firm patent strategy. This framework can be used for product-platform industries in at least the technology sector. Afterwards, the framework is being applied at the smartphone industry to show its working, relevance and applicability.

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Executive Summary

In lots of industries, and in an increasing rate of presence, patent strategy is being used. Even though patents were meant for protecting innovations, for already a long time the borders of this traditional patenting have been crossed-over. This makes the area in which this research has been done actual and relevant.

Not only the area of research, but also the research question: 'In what way do firm and industry related variables affect Mad Dog patent strategy in product-platform industries?' is actual and relevant. If we only give the patent war in the smartphone sector as an example, it should be clear that firm patent strategy is something is still open for research, and even becoming increasingly attractive.

First the firm and industry factors that could affect the patent strategy are being identified in literature and ordered to priority of taking into account and responding to. This has been done to show what a firm should think of and in what order, how various scenarios can be filled in, and so eventually how the firm's patent strategy should look like, given the factors the position it is in. At the end, the research question is being answered by a patent strategy decision-making framework for firms in product-patent industries.

The framework has been developed with the technology sector as the reference, because in the first place because the assumptions of this research are that the firm environment is dynamic and turbulent, which is in general also the case for the technology sector, and the technology sector is one in which the effect of the factors can be illustrated conveniently.

The relevance, working, and applicability of the framework is being shown in chapter 5 shown by applying the framework to the smartphone industry, as there is already a patent war running, which makes the framework easier to place in mind and also because it can in this way either predict future patent strategy of the smartphone firms, or analyze the present strategy.

Finally, the research ends with a conclusion, limitations, recommendations for further research, and contributions and managerial implications part in chapter 6. In chapter 7 a glossary can be found for several possible confusing terms.

With this research, as a tool for firms in industries in which strategic patenting and patent strategy is at the order of the day, the factors that have to be taken into account by firms in their patent strategy are being identified, analyzed, ordered to priority and eventually the way this firm strategy has to look like is being provided as conclusion.

| | |
|----------------------------------------------------------------------------------------------------------------------|-----------|
| 1. Introduction | 3 |
| 1.1 Background and motive for report | 3 |
| 1.2 Research question and method | 3 |
| 2. Theoretical framework | 5 |
| 2.1 Situation | 5 |
| 2.2 Firm and Industry Factors | 6 |
| 2.3 Patent Strategy | 11 |
| 2.4 Adapting the Abernathy-Utterback framework to the product-platform industries | 12 |
| 3. Effect of the chosen characteristics on firm strategy in the technology sector. | 14 |
| 3.1 The effect of the appropriability regime | 14 |
| 3.2 Dominant design paradigm | 16 |
| 3.3 Lock-in | 18 |
| 3.4 Players | 19 |
| 3.4.1 Personality | 19 |
| 3.4.2 Positioning | 21 |
| 4. The patent strategy decision-making framework | 23 |
| 5. Application of the framework in the smartphone industry | 27 |
| 5.1 Sketching the industry landscape | 27 |
| 5.2 The analysis | 29 |
| 5.2.1 The product manufacturers | 30 |
| 5.2.2 The platform developers | 31 |
| 5.2.3 The product-platform firms | 32 |
| 6. Conclusion, limitations, suggestions for further research, contributions and managerial implications | 33 |
| 6.1 Conclusion | 33 |
| 6.2 Limitations | 33 |
| 6.3 Suggestions for further research | 33 |
| 6.4 Contributions and managerial implications | 34 |
| 7. Glossary | 35 |
| 8. Appendix | 36 |
| 9. References | 37 |

1. Introduction

1.1 Background and motive for report

It has a long history, the smartphone, with the first real precursor in the beginning of the nineties. Lots of changes of course have occurred since then and we can say that with the launch of the iPhone in 2007, the era of the smartphones as a mass consumer product really started. Lots of people nowadays own a smartphone, the newest generation of mobile phones. Using it for our desires like information gathering on the internet, playing games for enjoyment or as a tool for business life is something lots of people are used to by now. However, when we pick up our smartphone to do what we want, do we realize what goes on in the industry, other than just manufacturing?

Since the 22nd of October 2009, Nokia sued Apple, Apple counter sued Nokia, Apple sued HTC, Motorola sued Microsoft, Motorola sued Apple, Apple counter sued Motorola, Microsoft sued Barnes & Noble, Apple sued Samsung and Samsung sued Apple. Some of the infringement claims are for product patent infringements, and others are for platform¹ patent infringements². This all happened in just three years, and still is not over as lots of lawsuits are still continuing, and others have recently started. These happenings reveal that there happens a lot besides just manufacturing the phone itself. Strategic patenting, infringement law suits and formation of strategic alliances are, especially in these last few years, frequently used instruments among the industry participants.

The smartphone industry description above is only an example out of other industries in which patent infringement lawsuits happen a lot and are impact-making. Not only law suits, but also patenting in different kind of ways for different kind of purposes, other than the 'traditional' purpose of patenting, is being seen much more often.

As 'patent strategy' is such a hot topic nowadays, especially now it is logical to have a revision of patent strategy research. Because of this actuality, but also the dynamics, and importance of the topic, and so the high degree of applicability of the research in this area, the scope of this research will be on the use of patent strategy in the technology sector.

1.2 Research question & Method

The foundation for this research's theoretical framework will be put by the article of Teece (1986). The framework that it provides will be used to end up with an own decision tree, like the one in the

¹A standard for the hardware of a computer system, which determines what kinds of software it can run (Oxford Dictionaries)

²The Apple-Samsung lawsuit is an example of both.

paper³, to answer the research question: 'In what way do firm and industry related variables affect Mad Dog patent strategy in product-platform industries?'. The paper of Teece will be a guideline for firm behavior in the indicated industries. The 'Mad Dog' part of the research question will be analyzed by a second core model for the decision tree: the game theoretical commitment model, developed by Fudenberg and Tirole (1984). A 'Mad Dog' is a firm that is characterized by 1) aiming to become the leader of its market, and 2) is not afraid of battling for it. During the research, the main topic will be 'patents & strategy'. This will be done by literature analysis.

The research question will be researched by asking, and seeking answers for, the following questions:

- *What are important characteristics of firm decision-making regarding patent strategy?*
- *In what way do they impact the patent strategy of a Mad Dog type of firm in the product-platform industries?*
- *To what outcomes does the application of the previous found results on the smartphone sector lead to?*

At the end of the research there will be a conclusion, limitations and recommendations as a recap and review.

This research will argue that even though industry lock-in effects, entry barriers, appropriability regime and other industry variables of this kind have an impact on firm strategy, this strategy will be primarily and mainly determined by firm-related determinants like the player commitment, and positioning, only secondarily on industry characteristics, but most important, it will be a combination of both sorts of determinants.

Eventually, as can be seen from the sub-questions, the analysis will consist of two parts. The first part will lead to a framework for strategic decision making in the product-platform industries. The second part will be an application of this framework in the smartphone sector. In this way, a working decision-making framework for managers will be provided to aid them in their patent strategy.

³ See Appendix 1 for the decision tree in Teece (1986) that will be used as a guideline.

2. Theoretical framework

2.1 Situation

Over the last years, common research in the area of the resource-based view of the firm⁴ (Arrow A) versus the industrial organization view⁵ (Arrow B), was either the question “What is more important for firm performance, the firm itself or the industry” or similar questions. So the effect on performance was measured, and the variables that were investigated were ‘firm’ and ‘industry’.

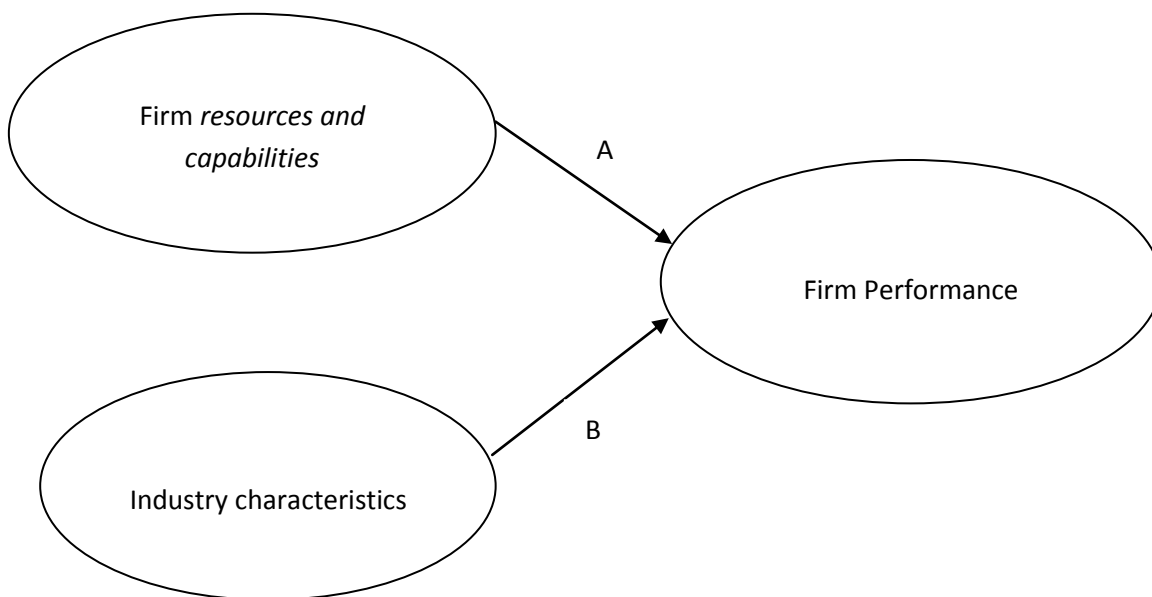


Fig 2. Nowadays' way of research, schematically shown

Lots of research has been done on whether A or B has the most effect on performance. First of all, it is important to understand what ‘performance’ really is or how it can be measured. Methods we can think of in these kinds of research are mostly ‘economic profit’ or ‘residual income’ and ‘market-to-book value’ or accounting ratios such as return on assets (Hawawini et al., 2003). Mostly research uses these definitions for ‘performance’.

Research shows, in global, that the direct effect of the firm on performance is larger than that of the industry on performance (Rumelt, 1991; Mauri and Michaels, 1997; Short et al., 2007), even though

⁴A view in which the firm is the unit of analysis as the basis for sustainable competitive advantage. The view argues that firm effects dominate over time, which suggests heterogeneity of firms because of barriers to imitation and the inability of firms to change their resource endowments over time. (Mauri and Michaels, 1997)

⁵A view in which the industry is the unit of analysis as the basis for sustainable competitive advantage. The view argues that industry effects dominate over time, which suggests competitive advantage depends on firms' scarce and imperfectly mobile stock of resources and distinctive capabilities, and on persisting asymmetries. (Mauri and Michaels, 1997; Besanko et al., 2010)

Hawawini et al. (2003) argue this is only the case for the industry leaders and losers, not for the ones in the middle.

This paper incorporates both views as it will research the clash of titans within the product-platform industries in the technology sector. However, it has a different perspective in researching the issue of performance and the affect of the two views on it. The dimension of analysis is still industry as well as firm level. However, where the usual analysis variable was firm performance, it has been changed into firm patent strategy. Of course will it eventually have an effect on firm performance.

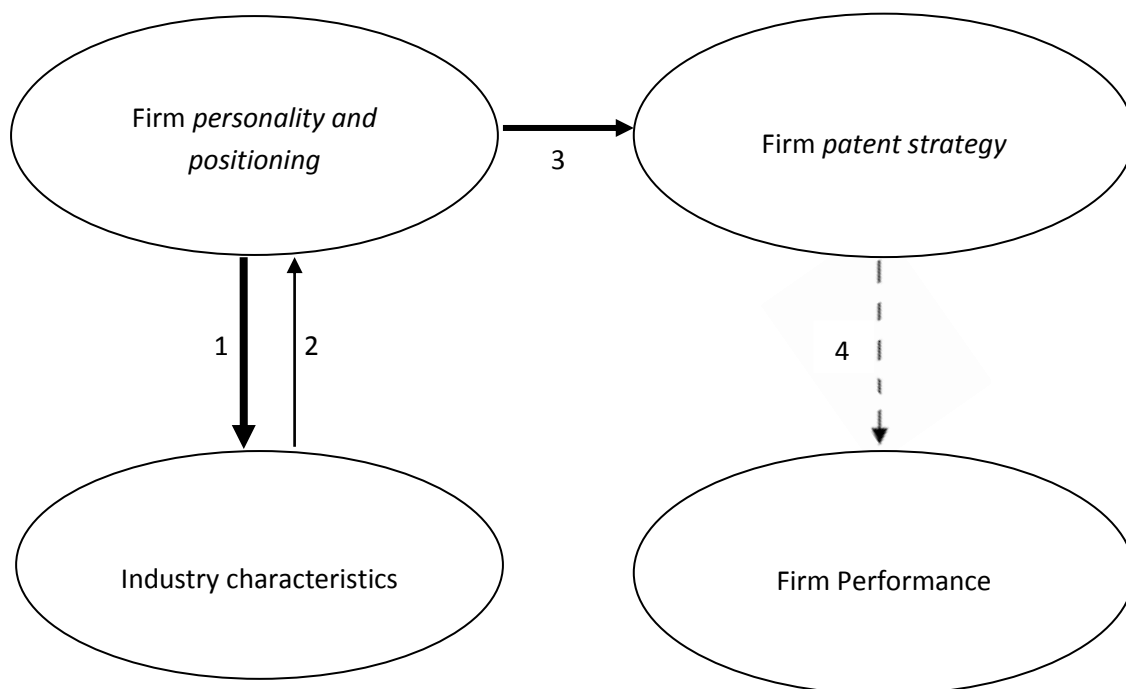


Fig 3. This research's schematic representation

2.2 Firm and industry factors

There are lots of factors that could affect firm patent strategy. Especially important are of course the factors in which you have to act as a firm. One of these environmental factors that are very important is, as Teece (1986) calls it, **the appropriability regime**.

The appropriability regime 'refers to the environmental factors, excluding firm and market structure, that govern an innovator's ability to capture the profits generated by an innovation' (Teece 1986). In this framework it will used synonymously with the degree to which intellectual property (IP) protection is effective. IP is then of course what the innovator brings forward as innovation, and the protection is the ability to indeed capture the possible profits. This appropriability regime is very important for the firm strategy.

Still, most probably the **player personality is** even more important. Fudenberg and Tirole (1984) have made a game-theoretical player-characteristics model for commitment strategy, which later has been expanded in Besanko (2010). This model can be found at the following page.

As industry characteristics can place some borders within which a firm is able to move, research shows that it is the firm itself primarily that decides how it will act, like the resource-based view of the firm argues, and so has more impact on firm performance than industry characteristics. This acting then of course is depending on the personality the firm has, as a Top Dog strategy and a Lean and Hungry look strategy are completely different from each other. If we then go a step further, industry characteristics might be changed or even set by firms that lead, or want to lead, the industry, like Top Dogs and Mad Dogs, making the player personality characteristic a critical variable.

As becomes clear from this model, according to the theory it is first of all decisive for firm strategy whether firms are strategic substitutes or complements. It can be said roughly that strategic substitutes are firms in a Cournot market, characterized by quantity competition, and strategic complements are firms in a Bertrand market, characterized by price competition (Besanko, 2010). The 'FT' subscript means that these are what Fudenberg and Tirole marked in their 1984 paper as beneficial strategies, while the others have been included in Economics of Strategy (2010) for completeness and are being seen as harmful strategies (Besanko, 2010).

To understand the table, and in that way the theory, it is needed to know what tough and soft commitments are. Though commitments are 'bad for competitors' (Besanko, 2010) and soft commitments are the opposite, so good for the competitors. In a Cournot market, committing to a capacity expansion would be a tough commitment. In a Bertrand market, committing to a price drop would be a tough commitment.

Also, very important for strategic decision making is **player positioning**. Just like the player personality, positioning is an initiative of the firm. The industry in which will be acted is present, and the firm will position itself in that industry, but is not bound in its choice by the industry. So, again a variable that influences patent strategy and is not primarily affected by industry factors, but by the firm's capabilities.

In the scope of this research, the player positioning is about whether the firm positions itself as a product manufacturer or a platform developer. Product producers are the producers of the tangible product in the technology sector that make use of a platform, which we define by using the following definition: a standard for the hardware of a computer system, which determines what kinds of software it can run. Within the platform category, a distinction has to be made between open and

closed platforms as they are quite different and choosing to pursue one strategy or the other makes a lot of difference. A firm with a closed patent strategy means that the firm pursues a strategy in which the source code of the platform is kept secret. So the firm develops the operating system itself, and also keeps it for itself later on by internal production, or at most sets up a contractual alliance with a certain firm, to have products produced. However, an open platform firm develops a platform, but also releases the source code for interested product manufacturers. This way, accessibility comes at the cost of that the platform’s exclusivity, voluntarily of course, as the firm delivers its platform widely. Key is to keep in mind that a fully open platform is not sustainable. Always some amount of closeness is needed to have an advantage.

| Nature of Stage 2 Tactical Variable | Commitment Posture | Commitment Action | Strategy | Comments/Role of Actor in Competitive Arena |
|-------------------------------------|--------------------|-------------------|-----------------------------------|-------------------------------------------------------------|
| Strategic Substitutes | Tough | Make | Top Dog ⁶ <i>FT</i> | Assert dominance; force rivals to back off |
| Strategic Substitutes | Tough | Refrain | Submissive Underdog | Accept follower role avoid fighting |
| Strategic Substitutes | Soft | Make | Suicidal Siberian | Invite rivals to exploit you; may indicate exit strategy |
| Strategic Substitutes | Soft | Refrain | Lean and Hungry Look <i>FT</i> | Actively submissive; posturing to avoid conflict |
| Strategic Complements | Tough | Make | Mad Dog | Attack to become top dog; invite battle heedless of costs |
| Strategic Complements | Tough | Refrain | Puppy Dog Ploy <i>FT</i> | Placate top dog; enjoy available scraps |
| Strategic Complements | Soft | Make | Fat-Cat Effect <i>FT</i> | Confidently take care of self; share the wealth with rivals |
| Strategic Complements | Soft | Refrain | Weak Kitten | Accept status quo out of fear; wait to follow the leader |

Fig 4. Commitment theory table (Besanko, 2010)

⁶ The difference between the Mad Dog and the Top Dog is primarily the environment in which they, according to the framework, operate. However, another difference is that there is only one Top Dog in a market that asserts dominance, opposing the Mad Dog of which there are more than one in an industry and these fight for the position of Top Dog within their industry. So game theoretically, the Top Dog is a tag for the leading firm in the strategic substitute industry and the Mad Dog for firms that pursue the position of ‘leader’ in the strategic complement industry. However, if we look further than this Fudenberg and Tirole paper, also in the strategic complement industry there can be a market leader, just like the Top Dog, in the long run. This the research will come back on further on in the research.

Another important characteristic in determining firm strategy is the **dominant design paradigm** (Teece, 1986). Abernathy and Utterback (1978) developed a framework that describes the technological evolution of an industry. They did this by making a two stage distinction in the industry development. The early stage, with floating designs, loosely and adaptively organized manufacturing processes, and generalized capital use for production, and the advanced stage with a dominant design emergence and a shift of competition towards price competition, away from design. Teece (1986) on its turn compares it with the pre-paradigmatic and the paradigmatic phases in 'the evolutionary development of a given branch of a science'. Important is that Teece, in the same paper, mentions that the framework seems to be not that suited for all industries. He indicates it to be 'more suited to mass markets where consumer tastes are relatively homogeneous. On the other hand he states that the framework would appear to be less characteristic of small niche markets where the absence of scale and learning economies attaches much less of a penalty to multiple designs'. So it will be slightly adapted to make it more suitable for this research.

The **complementary assets** are a special issue within this set of characteristics. As will be shown, it can be very important in the lock-in aspect of a good. However, it has also a different function, which is the step before the path dependency. Teece argues that a 'successful commercialization of an innovation' depends on the utilization of the know-how 'in conjunction with other capabilities or assets'. So complementarity is also very important for innovation commercializations.

A very important characteristic is of course the **lock-in** factor that is being offered. The lock-in effect is a part of the path dependency phenomenon. Liebowitz (1995) describes this as 'a minor or fleeting advantage or a seemingly inconsequential lead for some technology, product, or standard can have important and irreversible influences on the ultimate market allocation of resources, even in a world characterized by voluntary decisions and individually maximizing behavior'. Lock-in we then define as 'lock-in by historical events (Arthur, 1989). We can see it a lot in industries or sectors that have standards, important complementary assets, and switching difficulties that can profit from this lock-in effect. There are industries, like the shoe industry, lack this phenomenon, as the only way in which they can lock customers in is by making them associate the brand with a positive experience. On the other hand, especially the technology sector is one that profits from the presence of this phenomenon.

Lock-in is an important issue from a competitive advantage point of view, but certainly also the sustainability of this advantage. Sustainable, difficult to copy, persistent lock-in effects are key for a sustainable competitive advantage, and patent strategy is a way in which these lock-in effects can be made sustainable. Unsustainable lock-in effects are after all worthless in the long run. Making the

lock-in sustainable is possible by making the aspects that make these lock-in effects happen difficult to imitate through secrecy and patents. If we go a step further, trademarks^{7 8} are also very useful in achieving the same goal and can be used side by side with patents to develop an iron wall.

The lock-in factor is a major issue for firms. Having the advantage of lock-in effects is for the firm something that is very much desired. As much as it is a major advantage for the one that has access to them, it is a hostile phenomenon for rivals of these firms. Because of the strategic importance of lock-in effects, it is a major decisive factor for whether a firm will succeed or not in an industry, where at least one other competitor will have the access to them to some degree. As a consequence, two strategies are 'musts' for firms that want to become the leader of the own industry. The first one is to protect the own lock-in effects. The second one is to tackle those of the competitors.

2.3 Patent strategy

The aspect of firm strategy that will be covered in the framework will be the **patent strategy of the firm**.

Traditionally, patents were provided as an incentive to innovate in return for the disclosure of the invention. However, according to Arundel and Patel (2003) this does not mean that firms will not go beyond this traditional function. 'Economic rational' firms will exploit patents in ways that 'can result in economic gains'. This behavior they call 'strategic patenting'.

Researches most often have at least a clear division of strategic patenting into two forms: defensive patenting and offensive patenting. There is no unanimity in how these two terms have to be filled in. In this research it has been chosen to follow the definition of Arundel and Patel (2003), and they describe these two terms as following:

'Firms patent *defensively* to stop other firms from patenting one of its inventions and suing it for infringement, even though the firm does not need a patent on this particular invention in order to earn a return on its investments in innovation.'

'Firms patent *offensively* to prevent or block other firms from patenting inventions that are similar, but not identical, to the invention that they plan to commercialize. In this case, the firm builds a patent family or "wall" around its invention. This prevents other firms from commercializing competitive products, even though the firm does not intend to market or license these other products itself.'

⁷ Building Blocks of Sustainable Advantage (Besanko, 2010: 428)

⁸ As trademarks are not the main topic of research, we will not go into deep into this area. However, this could be an interesting area for further research.

Guellec et al (2012) adds to the description of defensive patenting the term pre-emptive patenting by calling it 'a type of defensive patenting; referring to patents (applications or grants) whose main motivation is to prevent others from patenting the same subject matter'. They also make another addition to the definition 'defensive patenting' by writing that 'defensive patents are primarily motivated by a desire to secure freedom to operate while at the same time, possibly serving to prevent entry by others into given markets or technologies (de Rassenfosse and Guellec 2009).'

Finally, there is also the action called 'secrecy'. This is something different than patenting, but certainly belongs to strategic patenting. Arundel (2001) writes about this the following: 'Firms that do not wish to disclose information can forgo patenting and use secrecy to protect their investment in the invention'. So secrecy means 'not disclosing the innovation'. Patenting means getting an exclusivity after disclosure, so the opposite. Important is to realize that 'patents and secrecy are not always mutually exclusive appropriation methods' (Arundel, 2001). A firm could use secrecy to protect an invention during a development phase and then rely on patents or other appropriation methods when the invention is on the market. Of course, firms can also use secrecy for some of their innovations and patents for others. So secrecy can be a replacement as well as a complement to patenting.

2.4 Adapting the Abernathy-Utterback (A-U) framework to the product-platform industries

As mentioned, there are some points that can describe the two-stage dominant design paradigm of the A-U framework:

- Floating designs, loosely and adaptively organized manufacturing processes and generalized capital use for production (Stage 1)
- Stage 2 incorporates the dominant design, price competition, scale and learning, and specialized capital (Stage 2)

However, this has to be slightly adapted to some extent to make the framework more compatible with the product-platform (p-p) industries. The point is that even though also in these industries there is a distinction in floating and dominance of design in stage 1 and 2, it is not only about design, but about a package, including also for example the platform and the product's technical capabilities. Only a dominant design is not enough. It is about a whole network of products and services combined.

This would leave us with the following:

- Stage 1: Floating package, loosely and adaptively organized manufacturing processes and generalized capital use for production
- Stage 2: Dominant package, price competition and scale effects within niche boundaries, learning effects, specialized capital

3. Effect of the chosen characteristics on firm strategy in the technology sector.

As the industrial view showed the importance of industry effects for firm performance, Teece showed the importance of the appropriability regime and the dominant design in firm strategy, Fudenberg and Tirole revealed that players can be separated in boxes depending on their commitment and stage 2 actions, the resource-based view of the firm perspective stipulated the critical role of firm positioning and actions as driving force of firm performance, the following factors will be the set that will be used for analysis:

- Appropriability regime
- Dominant design
- Lock-in effects
- Player personality
- Player positioning

Each characteristic will be analyzed in detail on its impact on the firm strategy. We will continuously assume that the sector is one characterized by turbulence⁹ and dynamics, and of course only look at the product-platform industries. As the technology sector in global possesses these characteristics, and also seems to be an interesting sector regarding the 5 factors, this research will use the technology sector as the sector of analysis.

3.1 The effect of the appropriability regime

As mentioned, industries can be in either a weak or a strong appropriability regime. This ruling regime is very important for the players that have to cope with the consequences of such a regime. Firms in the technology sector have to adjust their strategy in line with this regime, as this is a sector in which reverse engineering¹⁰ is above average attractive to do for entrants or followers. If there is a weak appropriability regime, this copying can be very harmful for the developing firm as the technology sector characterizes itself most of the time with high R&D costs, and the weak appropriability regime of course means that imitation is not that hard, and is at the same time difficult to prosecute. Imitation by a different player in the technology sector, without the high development costs that you as the first developer had to face, could allow the second-mover to leap in front. Because of this, when a strong appropriability regime is absent, and there are no means that can fill the gap that comes along with it, either innovation will be absent, or innovation will take place in those sectors only where there is such a small product life cycle, and thus such a high

⁹ A state of conflict or confusion (Oxford Dictionaries)

¹⁰ Reverse engineering is the process of extracting the knowledge or design blue-prints from anything man-made (Eliam, 2005)

innovation rate, that firms do not need the IP protection as secrecy can be used until products come at the market, and against the time of imitation of the previous product, a new product will be launched. This way, the imitation would have a way smaller effect.

So, if we look from the innovator point of view, firms in this sector would most probably prefer the strong appropriability regime. This way there is a high incentive to innovate for innovators as their value added can be the source of profits for a long time, without a high risk of imitation. However, as Teece (1986) states it, 'tight appropriability is the exception rather than the rule', so firm strategy has to incorporate the possibility of imitation seriously.

Appropriability is mainly dealt with by the patent strategy of the firm. It should be clear that patent strategy is much more used when the appropriability regime is weak because as in this case, normal patenting is not sufficient as means of protection and so other means have to be invoked.

As mentioned, there are certain types of patent strategy. A firm in a weak appropriability regime has to choose a patent strategy depending on the situation. In a very turbulent, very dynamic sector, like the technology sector in global, defensive patenting is very much needed to have an area in which to operate without the need to worry too much about risks and threats. This could be in combination with the secrecy strategy.

As patenting implies the disclosure of innovations, the innovation can be kept secret for a longer period of time by using the secrecy strategy. This way, competitors get to know the competition late, which could be a competitive advantage. Also, as a patent has a limited lifetime, the date of expiration can be moved further in time by postponing the moment of patenting. However, by delaying the patenting procedure until the time of market entrance, the threat of a competitor developing and patenting the same innovation or a part of it does exist. It could be a serious problem if a rival than patents what you as a firm wanted to bring on the market. Finally, it is the inventing around problem that withholds lots of firms from patenting (all) inventions. So the secrecy-inventing around dilemma has to be seriously considered.

Next to these two strategies, also the offensive strategy is very important when the appropriability regime is weak. This strategy is the other side of the coin when freedom of operation is desired. As defensive patenting grants this freedom by building barrages in fields where it does not need a patent to earn a return on its investments in innovation, but to ensure not being confronted with infringement law suits, offensive patenting builds barrages directly from a competition point of view, to keep out competitors in the sector it acts in.

So, the defensive patenting strategy is in turbulent/dynamic environments complementary with the offensive patenting strategy and the secrecy strategy. Because of the continuous threat by competitors, the uncertainty, but also because of the disadvantages of patenting, the three strategies complement each other.

With strong appropriability, the case becomes different. When the environmental factors are such that the ability to capture the profits generated by innovation is high, as is the case with a strong appropriability regime, then costly practices like offensive and defensive patenting are not that necessary anymore. Especially defensive patenting loses its attractiveness very much, as it is actually an act to fill holes that the actual patent could not cover enough because of the weak appropriability regime. Offensive patenting might still have attractiveness as it still is directly competition purposed. Also secrecy will lose attractiveness. A patent will be enough to get rid of risks and threats regarding profits of innovation as the regime means that inventing around is very difficult for competitors, and infringement will most likely lead to prosecution. This is also the case for the inventing firm itself, which means that if you patent too late, most likely it will mean the end of the project if a rival firm patents first. Patenting will be playing safe, secrecy on the other hand will be playing risky to delay disclosure a little bit more.

So globally, the appropriability framework for the technology sector is as following.

| | |
|---------------------------------------------|------------------------------------------------------------------------------------------|
| <p>Strong Appropriability regime</p> | <p>Offensive patenting, secrecy only attractive for extending technology exclusivity</p> |
| <p>Weak Appropriability regime</p> | <p>Certainly offensive and defensive patenting, degree of secrecy is a trade-off</p> |

Fig 5. Appropriability regime dependent strategy framework

3.2 Dominant design paradigm

When the word ‘global’ passes, it should come to mind that there most probably will be exceptions from the thing that is global. Here this is also the case. The phase in which an industry finds itself is important for firm strategy. When an industry is in the pre-dominant phase, the firm of course will behave different then when it finds itself in a dominant phase. In the pre-dominant phase, firms aim to set the standard. The interesting thing that the dominant design paradigm brings forward is that you just do not know at the point that the standard is reached that the standard is reached. So it is

only clear ex-post. Because of this, firms will compete with each other to become the standard by themselves until it is undeniably clear that the standard is reached, with the chance that the standard is already there. Up to this point of acceptance, denial drives the competitors of the firm that developed the standard to innovate in such a way that a better standard is reached. The high degree of competition will of course go along with lots of patenting to keep the parts that could build the standard exclusive. This will not stop when the dominant phase is being reached, but when it is being reached and also agreed on by all the players. This all can also be seen in figure 5. Even though the dominant phase is being entered at the point of the dotted line, total innovation keeps increasing until the point the circle indicates. The lag is then what has been called the recognition of dominant phase ex-post and the adaption to it.

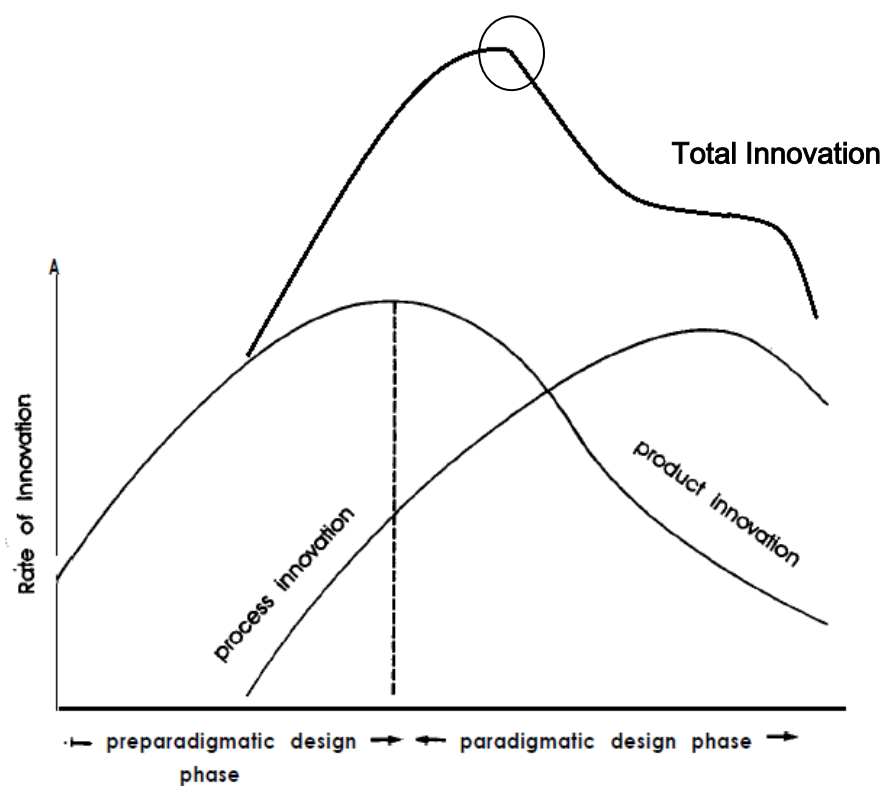


Fig 6. The Abernathy-Utterback framework's innovation curves, below the original, and above the added 'total innovation' graph.

After the standard has been set, the innovations will be only incremental. This could be compared with the saturation phase in the product-life cycle¹¹. Degree of innovation will drop, quantity will drop, and so will patent strategy be much less a pre. Searching and waiting will be for the next breakthrough that could open up a new product industry, and unleash the mighty competition-stimulating forces of the battle for the standard once again.

¹¹ A 'view (...) about how technologically progressive industries evolve from birth through maturity' (Klepper, 1996)

3.3 Lock-in

Lock-in exists in all kinds of ways. The most important ones are among others **the brand, the feeling, standards, complementary assets, and the creation of switching difficulties**. These of course have to be maintained somehow as an advantage. The **brand** is often being protected by trademarks. This has become more a common action than strategy. **Feeling**, again, is something which firms cannot patent directly. There are certain factors that create the feeling, associated with a brand that can be patented. The operating system, complementary assets, but also the design of a product is one of many examples of factors that can be patented. Patenting the experience in this way will not be directly to feeling, but to technical issues. However, if certain technical capabilities can be made critical for a feeling, for example the easiness of a platform, then this way patents can be used for feeling protection. However, direct protection of a feeling is not impossible, as the previous mentioned Lego case reveals. Patents and trademarks can be excellently used together in this area to cover areas that one of the two by itself does not cover, and in this way complement each other.

The way in which patent strategy is a weapon in the **standardization** process of an industry we already have talked about. But we have only discussed it very globally on the firm level. For firms that behave in a p-p industry, it is more than clear that they either have to set the standard, or will be users of a standard developed by others, resulting most probably in a following role or even a background-player role. So if goals are set high, firms will use patent strategy aggressively to become the number one. The development of a standard is of course a process of trial and error. Every time a design for example comes forward, the necessary patent protection will be set. Depending on feedback, the best components will be taken forward to the next step in developing the standard, and the lesser components will be left aside to minor goals or will be disposed. All possible sorts of patent strategy will be used to set the standard.

Complementary assets can of course also have their role in this. The emerging of a standard does not only depend on a product itself, but especially also on complementary assets. A lesser product with much better complementarities is able to win the battle of standards. And finally, the setting up of **switching difficulties** can help a lot in becoming or remaining the standard. As the exit barriers for the consumer are placed high, the competitor has to do much more effort to snatch consumers. Both criteria of the lock-in factor can be made sustainable by patent strategy, as offensive patenting will make sure that the competition won't come too close, and defensive patenting will enable maneuvering space. Having a large consumer base is also an example of switching difficulties.

Switching difficulties can be confused with complementary assets. The difference is in whether consumers are attracted or 'forced' to stay with the firm. We then can think of programs that are complementary, but not adaptable to the complementary assets of other firms.

3.4 Players

The following factor that leads to deviations from the global framework in 3.1 is the firm itself. This we split in a player personality part and a type of firm part.

3.4.1 Personality

For the player personality part, the expanded commitment framework of Fudenberg and Tirole (1984) will be used. This framework was built on the Cournot and Bertrand oligopoly competition models. This framework has several assumptions that make the framework possible. However, they also restrict the applicability of the framework into reality. Let us take a look at the assumptions of this framework.

Assumptions of the Fudenberg and Tirole framework

First of all, it is about an oligopoly market, consisting of only two firms. These firms 'produce identical goods' (Besanko, 2010), making them 'forced to use identical prices' (Besanko, 2010). Very important is also to realize that the framework is only a snapshot, so very static.

With Cournot competition, the weapon for competition is the amount the firm chooses to produce. 'Once the firms are committed to production, they set whatever price is necessary to clear the market. This is the price at which consumers are willing to buy the total production' (Besanko, 2010).

With Bertrand competition 'each firm selects a price to maximize its own profits, given the price that it believes the other firm will select. Each firm also believes that its pricing practices will not affect the pricing of its rival; each firm views its rival's price as fixed' (Besanko, 2010).

The technology sector is not one of in which there are only two firms, not one with a fixed production, and firms will definitely take into account the pricing of the competitor and take this into account with the own pricing. And not to forget, the industry is certainly not static, with for example the smartphone sector that is growing and growing. Because of these restrictions, a broadening of the framework is necessary.

Broadening the Fudenberg and Tirole framework

First of all, the way of competing helps us to see at which set of strategies we have to look. As Stenacka and Tombak (2003) found that often two firm industries are strategic complement industries, and that also the consumer electronics be found within these industries, it would mean that we have to look at the bottom four strategies¹², which are the Mad Dog, Puppy-Dog Ploy, Fat-Cat Effect, and Weak Kitten strategies. The strategies tell, next to the way firms use pricing strategy, also something about the firms' personality. This we can use to broaden the framework. The personality of a firm tells us how the firm will act and respond, and this will be the same for all sorts of actions. By using this firm personality, we can extend the pricing or quantitative behavior into patent strategy behavior.

The **Mad Dog** strategy means that the firm makes a tough commitment and sticks to this. In terms of Bertrand, this would mean that the firm commits to lowering the price, and sticks to this. The result would be a price war. We can translate this to a firm that commits itself toward setting up an infringement law suit when its being imitated, and actually does it, resulting in a patent war. Would the firm refrain from this commitment, then it is being called the **Puppy-Dog Ploy**. In a Bertrand market, this one is being seen as a more beneficial strategy in this kind of industry. By accepting infringement the firm tries to avoid a patent war, and satisfy the leading firm, which are the Mad Dogs in this case. However, recall that this framework was only a snapshot! So, as Besanko (2010) writes, 'such strategies can make sense if the firm views price competition as a dynamic competitive process. If so, short-term strategic losses might be offset by long-term gains'. Another possible long-run consequence of evoking a patent war is 'entry deterrence' (Besanko, 2010).

This using of the framework for not only short term but also long term goals, after analyzing the limitations and pulling on them, is then the second broadening of the framework.

The same of course is also counting for the soft commitments. The beneficial strategy for the short run is, according to the framework, to make it. This **Fat-Cat Effect**, again, is with the thought to not evoke wars. As Besanko (2010) also comments, by pursuing this strategy the firm 'shares the wealth with rivals', meaning that it shares its innovative stock with other, making competitors better off. Would it refrain, than the firm is being characterized as **Weak Kitten**, because of its signaling effect. Doing an action indicates at least a certain amount of guts. First of all, the firm that does a soft commitment most probably is not able to do a trustworthy tough commitment or could not get an advantage out of it. So even in that situation, you commit yourself towards an even more

¹² See the table in section 2.2

advantageous position for the competitors, and afterwards refrain. This will logically lead to a dramatic signaling effect.

3.4.2 Positioning

The second factor is not about the firm personality, but about the type of firm. Not every firm in an industry takes the same position. The focus of this part will be on 'product and platform'.

A firm is not able to do everything at the same time, so makes decisions regarding the role it is going to fulfill within the industry. This decision also influences firm patent strategy. First of all, the role within the platform side of the industry is important. Some firms do only develop platforms. This most likely means that some other uses it. Products for the platform are then external produced. This way of operating of course can have several forms. The platform producer can contract the product producer, making it look like outsourcing, but can also fully withdraw itself in only producing the platform and letting others independently manufacture products for the platform.

The main distinction though is between patent strategy by a platform developing firm and a product producing firm. The product producing firm will be more involved with patent strategy, because it has to protect something clearer, more tangible. Because of this property of products, they are easier to protect by offensive patent strategy, and are the same time also easier to copy. The less tangible platforms are of course more difficult to copy, but also more difficult to protect. The difficulty in copying the platform is that no matter how open the platform is, it will always have a secret and so unrevealed and hidden part. Products on the contrary can be fully reverse engineered. This is of course also the reason why product manufacturers have to patent everything neatly.

A second distinction that happens within the platform category is a patent strategy with open platforms and a patent strategy with closed platforms. The difference should be looked at from an operations point of view. The closed platform strategy pursuing firm will have to patent more, because it will most probably develop as well as produce. The open platform strategy pursuing firm can of course produce a product itself too. However its main goal is on global the development of an open platform, which will be most profitable if distributed all along. Because of this, its patent thicket will be less big, due to a relatively minor patent activity. This can however change during extraordinary events like patent wars of firms that use the platform. Because of strategic reasons, the developing firm can extend its patent portfolio to support its partners, as it is also attacked by such an event, indirectly.

Schematically, the table for this perspective is the following:

| X | Product | | |
|----------|---------------|---------------------|---------------------|
| Platform | | Internal Production | External production |
| | Produce | | |
| | Produce & Use | | |
| | Use | | |

Fig 7. The positioning table for p-p industries in the technology sector

This table is able to incorporate every player from the p-p point of view.

4. The patent strategy framework for firms in p-p industries

If we take all the former seen information together, we are able to form a decision making model for patent strategy. As the decision will be an accumulation of answers on questions, the all-decisive building blocks will come at the start, and those factors that could make incremental changes to the final decision come at the end.

The first, most important and all-decisive factor is the type of firm. Even though industrial factors are very important for the firm, as explained before, the firm itself decides the way it acts, and can even pull on and change industrial factors if it has certain leading capabilities. For the scope of this research there were four strategies. However, for simplicity and relevance this model will be only for a 'Mad Dog' strategy pursuing firm, but can be modified for all kinds of strategies that we have seen in the commitment strategy theory. The Mad Dog strategy has been chosen because of all the other strategies, it is the most impact-making and also it is excellently usable for the application later on in the smartphone industry.

After the firm personality, a resource-based view of the firm factor, the second and third factors are industry factors, with respectively the question whether the environment is characterized by a strong or weak appropriability regime, and whether there is a floating package or not. As we already had determined the firm personality, with these industrial factors the firm determines how it will make use of the situation. A Weak-Kitten will not deal the same with this information as a Mad Dog will.

Almost all the industries are characterized by weak regimes (Teece, 1986). Because of this, the focus will be also on this kind of regime. The strong regime will be only slightly touched by repeating what previously was mentioned: Patent offensively, and secrecy is only attractive for extending technology exclusivity. Defensive patenting is not required.

Then of course the question whether the industry is characterized by a floating package, or not. It is often difficult to say whether the standard has been set ex-ante. Ex-post it is, as mentioned, of course not that hard, but during the industry-life cycle this certainly is. Nevertheless, it is theoretical possible to, in a perfect environment, understand that the standard has been set of course. If there is no floating package, it is important to know whether there is a standard set and if this is the case, whether the firm itself is owner of the standard, or that someone else was first. If you yourself have set the standard, license it to the others. From a psychological perspective and from a financial perspective it will be advantageous. Of course you can stop the rest from going on in the industry when you do not license. However, beware of the fact that you this way force the others into an innovate-radically-or-lose-the-battle situation, and of course you lose the possibility of royalties.

Also, perhaps one of the less thought-about reasons to license is that the legislation and industry controlling institutions might force you to do so. Do you not have the standard, but someone else? License from the holder, but do not forget to innovate radically to leap frog. As 'Mad Dog', the commitment is in that way and refraining from this will definitely leave you as a one of many.

If the package is floating, only then we start with making the distinction of player position. Are we a product producer, a platform developer, or a combination? Afterwards, in the same order, we ask whether the firm possesses sources of strong lock-in effects, whether these are sustainable, whether there are crucial product-product producing partners.

Let us start with the assumption that we are a product producer. If a product producer has weak sources of lock-in, this is not necessarily a reason for panic. The requirement is however that the firm keeps innovating at the same speed and level, and so delivers continuously quickly good products. Malfunctions are fatal as there is nothing to bind the consumer. So even though lock-in is not a must, it is definitely advised. Only the possession over lock-in is not enough though. It also has to be sustainable. A source of lock-in should not be lost in a few months due to hostile movements. This has to be taken into account and has to be taken measures for by either patenting the technological aspects related to these lock-in effects, or by 'trademarking' emotions directly. This way, the lock-in effects will be sustainable. Finally, for the product producing firm in the p-p industry of the technology sector it is of course important to take its ties with platform developers into account. Are there any crucial platform-developers? If there are any, invest in the relationship for continuity, and so they can back you up in case of a patent infringement. Even far-going cooperation is possible by melding the portfolios together. At the end of the ride, the firm should patent offensively to keep out close competition, patent defensively for maneuvering space, and of course consider secrecy, depending on the firm's situation.

If we would have been a platform developing firm, all becomes slightly different. Again we start with the same question. Are there strong sources of lock-in effects? If a platform developer does not have access to them, it is quite problematic in contrast to a product producer. This position is not sustainable. Software development takes more time compared to the products. Because of this, software developer of course have to hold their consumers for a longer time span to themselves, which is only achievable by having lock-in effects. If this is not the case, the risk is there that the consumer base will run low against the time a new version arrives. Again, by either patenting the technological aspects related to these lock-in effects, or by trademarking emotions directly, these lock-in effects can be made sustainable.

A different question then was asked in the 'product' decision-making tree, is whether the developer develops open or closed platforms. The difference is in the strategy behind the choice. An open-platform developer develops the platform, and afterwards makes it widely available for product manufacturers. The closed-platform developer most of the time also produces the products itself, as the source code is kept secret. As we will come to this later on, there is a hybrid combination possible, in which the developer develops a closed-platform, and then outsources the production to a single firm. This way, the source code is still kept secret to all, except the single firm. However, this distinction is not needed for now. An open-platform developer should ask itself the question whether there are crucial partners that develop the products on which the platform will be used. Most of the time they are present and if this is the case, then the firm should calculate this through in its portfolio building. The firm could get into serious trouble when those important partners become lost. So also having weaponry for them in case they get involved in a patent war would be preventive. Is there no crucial partner, then the second question for this firm is whether there is another mad dog strategy pursuing firm. Is the answer 'yes', then again, also support the partners' portfolios as they can be attacked to indirectly attack you. Would the firm be a closed-platform developer, then because of the fact that the continuity of your platform depends on the manufacturing of the party which manufactures products for your platform, it is again not too bad to build a portfolio too for the partner. Eventually, open or closed, every platform developer should patent offensively to keep out close competition, patent defensively to have maneuvering space and should consider secrecy, depending on the firm situation.

Finally, the 'product and platform' producing firms. All remains primarily the same, up to the question whether the firm produces open or closed platforms. Again, the reason for this is that this fact determines the way a firm operates. The closed platform developer will in this case produce the products itself only. The open platform developer will produce itself, but for the sake of market share also release the source code, most probably to attack the other Mad Dog. As is logical, the open-platform developer has to build a patent portfolio for the own platform, product, and for the products of the other firms that use its platform. The strategy, as said, is on market share, meaning that the firm is impotent at this stage to pursue the goal of 'gaining as much market share as possible' by itself. So because of the strategic importance of its outsource-partners, they also have to be protected against infringements, as they are an important part of the platform developer's strategy. Next to this, both type of firms end in the following strategy: Patent offensively to keep out close competition, patent defensively to have maneuvering space. And again, consider secrecy.

The framework then will schematically look like the following

5. Application of the framework in the smartphone industry

Now we will apply this framework that we have developed for the product-platform industries within the technology sector on the smartphone industry. We of course start at the ‘start here’ box, and continue until we get at a dead end. But before we start, we will have to define the players as the model has been made for the Mad Dog type of firm.

5.1 Sketching the industry landscape

Within the smartphone industry, there are several key players. If we place them in the table in figure 7 to see which player does what, it will look like the following:

| X | Production | | |
|-----------------|--------------------------|------------------------------------|----------------------------|
| | | <i>Internal Production</i> | <i>External production</i> |
| Platform | <i>Produce</i> | | Google, Palm |
| | <i>Produce & Use</i> | Apple, RIM, Nokia | Microsoft |
| | <i>Use</i> | HTC, LG, Nokia, Samsung, Sony etc. | |
| | | | |

Fig 9. Placing the players into boxes

To determine the Mad Dog, we look at which firms match the definition of the Mad Dog strategy the most. Let us have another look at the definition of the Mad Dog strategy:

‘The firm makes a tough commitment and sticks to this’

We also have shown that because we use the patent strategy of a firm as that what we want to research, in this paper we will have to look at this definition in these terms. So for example patent infringements, reactions to patent infringements, and the way of composing portfolios are important criteria. For example, if you as a firm can be easily infringed without countering the infringing firm with a law suit, then you are definitely not a Mad Dog. Nowadays, we can see that there are actually three fronts within the smartphone industry: the Apple front, the Android front, and the Microsoft front. These are the big players, and each of them is fighting to become the leader of the smartphone market. Each front of course needs a product manufacturer and a platform developer. In the Apple front, Apple develops its iOS platform and manufactures its iPhone by itself, the Microsoft front consists mainly of Microsoft developing the Windows Mobile/Windows Phone platform and Nokia manufacturing the phones, the Android front consists of Google as the developer of the Android platform and lots of phone manufacturers, but Samsung as the strongest. Each developer and

manufacturer named fulfills the Mad Dog type of behavior. Apple has already shown that infringement will not be tolerated and will be countered aggressively, even though critical business relationships are at stake¹³. Samsung also showed that it will not back off for these kinds of actions and will countersue¹⁴ and even start new law suits on its own¹⁵. Google then also showed support for Samsung in its lawsuits. Microsoft has only recently become a big player after its cooperation deal with Nokia, but also Microsoft has proven to be a Mad Dog in its strategy by suing Motorola¹⁶ and other actions like its cooperation with Nokia, fast and innovative development of its Windows Phone platform for different price classes that show its intentions regarding its place in the smartphone industry. All parties are also leaders in their industry or aiming to be the leader. Nokia for example explained its choice for the cooperation with Microsoft, as Nokia CEO Stephen Elop says, to be to “innovate and differentiate, and create a new global ecosystem that creates opportunities beyond anything that currently exists today”¹⁷. The refusal of becoming just another licensee, and in that way taking large risks by becoming a new third party together with Microsoft to differentiate, become something normal, and of course become “competitive”, as Elop puts it, is why Nokia has been tagged as a Mad Dog.

If we, for completeness, also label the other players in the smartphone industry, the Besanko-table will look as following.

| Nature of Stage 2 Tactical Variable | Commitment Posture | Commitment Action | Strategy | Comments/Role of Actor in Competitive Arena | Players |
|-------------------------------------|--------------------|-------------------|--------------------------|-------------------------------------------------------------|------------------------------------------|
| Strategic Complements | Tough | Make | Mad Dog | Attack to become top dog; invite battle heedless of costs | Apple, Google, Microsoft, Nokia, Samsung |
| Strategic Complements | Tough | Refrain | Puppy Dog Ploy <i>FT</i> | Placate top dog; enjoy available scraps | RIM |
| Strategic Complements | Soft | Make | Fat-Cat Effect <i>FT</i> | Confidently take care of self; share the wealth with rivals | Sony, HTC, LG |
| Strategic Complements | Soft | Refrain | Weak Kitten | Accept status quo out of fear; wait to follow the leader | |

Fig 10. Extended version of the Besanko-table’s strategic complements part

¹³ <http://www.theverge.com/2011/04/19/apple-sues-samsung-analysis/>

¹⁴ <http://www.theverge.com/2011/04/22/samsung-countersues-apple-korea-japan-germany-us//in/2297513/>

¹⁵ <http://www.theverge.com/2011/04/29/samsung-sues-apple-infringing-10-patents-closer//in/2297513/>

¹⁶ <http://www.engadget.com/2010/11/10/motorola-slaps-microsoft-with-a-pair-of-patent-infringement-laws/>

¹⁷ http://www.youtube.com/watch?feature=player_embedded&v=Qrxu_1mOp6I

RIM pursued in the past a tough strategy, but during the last months significantly refrained from this strategy. The statement that “there is nothing wrong with RIM”¹⁸ by CEO Thorsten Heins, even though RIM makes a free fall, delays new product lines and platform innovations, and below-expectation introductions made RIM refrain from its tough strategy, resulting in the Puppy Dog Ploy tag. Product manufacturers as Sony, HTC and LG are somewhat glad with their position in the market. They share the possible wealth, do not go for the overall market leadership explicitly, and try to hold the own position, and in that way earn the label Fat-Cat.

5.2 The analysis

After having determined which players are pursuing Mad Dog strategy we can start with our analysis by following the framework to see what the path to follow is in the smartphone sector. As can be seen, the first question is whether the industry is one characterized by a weak appropriability regime. The answer here is ‘yes’, as is easy to derive from the outcomes of the patent wars that are going on between mainly the Apple and Samsung front. Some claims are accepted, others are rejected. Some claims are being invented around by updates, others by manufacturing tricks. The next question is whether the industry is characterized by a floating package or not. The smartphone industry is a battlefield of three different approaches by the three different fronts mentioned before. Each front offers an “ecosystem”, as Elop calls it, and battles to become the standard. Also, each front chooses its own way, having iOS for example as a closed operating system, enabling primarily ease of use and an experience within a closed cycle, Android as an open one, chasing market share through licensing the operating system to lots of manufacturers for free, and in this way enabling a lower sales price. Windows Phone then acts as a hybrid, in also licensing its operating system to players but primarily and in an exclusive way to Nokia. Future will show which one will become the standard, but for now the package is still floating.

As the package is floating, now we come at a split in which different types of firms of course will have to pursue a different strategy. The product and platform road will be walked down by Apple only, as it is the only firm that develops a platform and manufactures a product for that platform at the same time. Even though Google has its Nexus-line¹⁹, the production is not by Google itself but contractual by a manufacturer as Samsung²⁰ and HTC²¹. So Google, and also Microsoft, are for now²² only

¹⁸ <http://www.forbes.com/sites/ericavitz/2012/07/03/ceo-thorsten-heins-theres-nothing-wrong-with-rim/>

¹⁹ Google phones

²⁰ Nexus S

²¹ Nexus One

²² There are rumors that Microsoft has intentions to start producing by itself:

<http://www.businessinsider.com/microsoft-is-working-on-building-its-own-phone-says-nomura-2012-6>

platform developers. Then, Nokia and Samsung remain as the only product manufacturers. The application continues with the product manufacturer part.

5.2.1 *Product manufacturers (Samsung, Nokia)*

Do the product manufacturers have strong lock-in effects? Both manufacturers have developed a strong brand over the years. Samsung is even more strengthening its brand nowadays with its successful series of Galaxy products. Nokia on the contrary had a few years ago one of the strongest consumer brands, but because of its slow and faulty transition into the smartphone industry and the logical bad results as a consequence, the brand starts to break little by little. However, the of decent sales for a long time, even though competition was many steps further, still proves the strong brand Nokia remains to have.

Both firms, and actually all only-product firms, have the issue that they can lock-in consumers by providing them a good experience with the brand, and hoping that it was enough to not let the consumer step into a new adventure with a new brand. This of course then is by either producing decent, near-faultless products with a competitive price-quality ratio. What we see is that manufacturers also try to slightly modify the phone to have it a different look compared to the competition. Samsung for example has its TouchWiz interface.

So it is all about providing a good experience, for a competitive price, and having this all associated with the brand for a next-time buy. Both firms do have their lock-in effects, Samsung because of its last years' performance and Nokia because of its mobile phone successes in the past. Are they sustainable? For a short-run they are, if the success were repetitive for a decent amount of time. For a long-run not, as bad experiences will fade away the good associations with the brand and no other lock-in factors are present. So, if both firms can continuously deliver good work, everything is fine. After a long period of success, a slip is also not that problematic. But repetitions of malfunction have to be avoided at all cost.

Samsung has for the moment the Android platform as its main operating system. This is a rather critical cooperation, as all of its successful products depend on it, and so Samsung should heavily invest in the ties to protect its own continuity and be assured of back-up in case of infringement law suits. Nokia also has a partner that provides it for its main operating system, Microsoft. So for Nokia, the same thing counts. Both firms do also sell phones with an own operating system, but these aren't core business anymore for a while and in terms of continuity, quality and profitability, core business depends on the external operating systems.

Both firms should patent the innovations they make to ensure that they punish imitation and also earn something additional on these innovations. Also, they should patent the borders of the path in which they want to precede, and scan whether techniques that are being used aren't patented before to avoid law suits.

5.2.2 Platform developers (Google, Microsoft)

How about the platform developers? Do they possess sources of lock-in? Both Google and Microsoft have more weaponry and options within this field than the product manufacturers, as the platform developers are the providers of the ecosystem in which the product will find itself. Google provides excellent synchronization with its services like Gmail and Google Calendar, uses the cloud to save records for a next-time buy easiness, provides loads of applications through its 'Play Store', and there are lots of other sources of lock-in. They are also sustainable as what needs to be patented has been patented, and the firm constantly innovates to keep ahead, and extends its services and in that way its ecosystem. Preceding in the same way is definitely a sustainable option. Microsoft pretty much does the same by using the cloud again for saving records, synchronizing the operating system with the PC and the Tablet through its Windows 8 operating system²³, providing also access to lots of applications and providing services like Microsoft Office. By again patenting, extending and innovation, these sources of lock-in are made sustainable. Just like Elop says, it is a battle of ecosystems, and to remain in the game, platform developers have to possess sources of lock-in that are sustainable, and have to provide an extensive network of exclusive services. Otherwise, the game could be over very quickly.

The Android platform of Google is an open platform that has a few product manufacturers that are crucial for the persuasion of its goals, and because of this reason, Google should also build a portfolio for crucial partners to protect them in case of infringement law suits.

The Windows Phone platform of Microsoft is a kind of hybrid version, having a closed platform which you provide to licensees for royalties. The licensee is in this case Nokia. Even though it is not an open operating system, it does have Mad Dog strategy pursuing competitors, and so has to also take Nokia into account when building its patent portfolio.

At the end, both firms have to patent offensively to prevent competitors of coming too close, and patent defensively to have the desired maneuvering space. Secrecy could be very handy to have a longer time span in which to profit of the patent as some technologies are important for a long series

²³ <http://www.theverge.com/2012/6/20/3098962/windows-phone-8-announced-by-microsoft/in/2865586>

of years. In that sense, if the firms are sure about what the competition has to offer in that context, secrecy is certainly a useful tool.

5.2.3 *Product-Platform firms (Apple)*

Finally, the Mad Dogs that develop platforms as well as manufacture products. There is only one of them in the smartphone industry: Apple. Apple possesses, just like Google and Microsoft, lots of sources of lock-in. It has special software for example²⁴ that can only be fully used if you have an Apple product. The consumer of course gets used to this software, which can be for example used to synchronize music or record information. This software then is on purpose made non-adaptable to other devices. This way, if a consumer wants to switch to another brand, it will face a large exit barrier. Of course there are also lots of other lock-in effects that come from, among others, its strong brand and its cloud services. They are also sustainable in the sense that Apple continuously innovates to expand and strengthen the services and doesn't tolerate any imitation. Apple patents what has to be patented and does not back-off for firing law suits on imitators.

It should be mentioned though that competitors try to copy and improve the lock-in factors of Apple and also try to make adapters that allow customers of Apple to switch easily to competitors. There is a huge battle going on for the best and exclusive lock-in factors, so a small moment of slack can be with huge consequences.

As Apple's iOS operating system is a closed one, and in that sense produces also its own iPhones, Apple should only patent for itself and its own operating system. Also, it should again patent offensively to keep out close competition and defensively for maneuvering space. Secrecy is also for Apple a useful option for pushing the expiration date of its patents further in time for the same reason as before. Some technologies can be long lasting and this way, time can be used more efficiently.

²⁴ iTunes

6. Conclusion, limitations, recommendations for further research, and managerial implications

6.1 Conclusion

This paper aimed and has tried to answer the research question ‘In what way do firm and industry related variables affect firm patent strategy in product-platform industries in the technology sector?’. To answer this question, it has been argued and shown that for a decent decision-making framework, at least the following factors, in order of priority, have to be present: Firm personality, Appropriability regime, Dominant package, Firm positioning, and Lock-in effects. However, during the research it has been clear that at least also the factor ‘Partners’ has to be present for a more complete picture. By analyzing possible actions of firms in the possible variable situations, a framework for firm patent strategy in p-p industries has been developed. To show its working, relevance and applicability, the framework has been applied on a very actual and suitable case: the smartphone market. The developing of the framework and the application of it on the smartphone industry has all been done from a Mad Dog firm type perspective for simplicity and relevance.

6.2 Limitations

The research has shortcomings though. Most important would be that the research is theoretical only, making it a research that has no proving power. Second, the core theory is rather old, so both because the topic is very actual and dynamic, new theory could emerge which should be used to redo the research, or if a newer set of theory is possible, it could be used now already. A positive point in this regard is however that the theory used is fundamental research, so even though new findings could have been made, the fundamentals may remain the same, as might be the case here.

6.3 Recommendations for further research

This research does also open up many doors for further research. The framework could be extended with more core factors for example, like the previously mentioned ‘Partners’ factor. Also, the assumptions and predictions of the framework should be analyzed statistically and either the framework could be broadend or the framework could be modified to cover the other firm types that are possible according to the Besanko-table. Another improvement to this research could be seeking whether this framework, or an adapted version, is also applicable into other sectors. Finally, other forms of patenting could be used to extend the framework. This research has used three explicit forms, but it could be that they do not cover the whole patenting. Offensive and defensive patenting are being done for the own good, as for example avoiding comparable innovations or infringement

law suits, and so not directly for the competitor's bad. A term like 'hostile patenting' could be developed, verified, and used for further extending and empowering the framework.

6.4 Contributions & Managerial implications

The borders of the traditional function of patent strategy have been crossed many years ago. Patent strategy is way more than that for a long while, and firms should realize this and respond. This patent strategy framework for firms in p-p industries grants, for the Mad Dog firms, insights into patent strategy, how to use it, when to use it and for which goals. The critical factors for p-p firm patent strategy have been determined collected and ordered according to their priority in decision making. This way, managers can see what to take into account for their patent strategy and in what order. Furthermore has this research shown how managers should deal with these factors and how they should react in certain situations regarding to these factors. For the possible scenarios, management advice has been given for the patent strategy of the Mad Dog type of firm in p-p industries in the technology sector. Finally, a very important contribution to scientific research is that a foundation has been set towards a larger, more-covering and acknowledged decision-making framework that can be a guide for firms in their patent strategy.

7. Glossary

Mad Dog: Attacks to become the top of the market and invites battles heedless of costs to achieve this goal.

Patent strategy: The use of patents in firm strategy

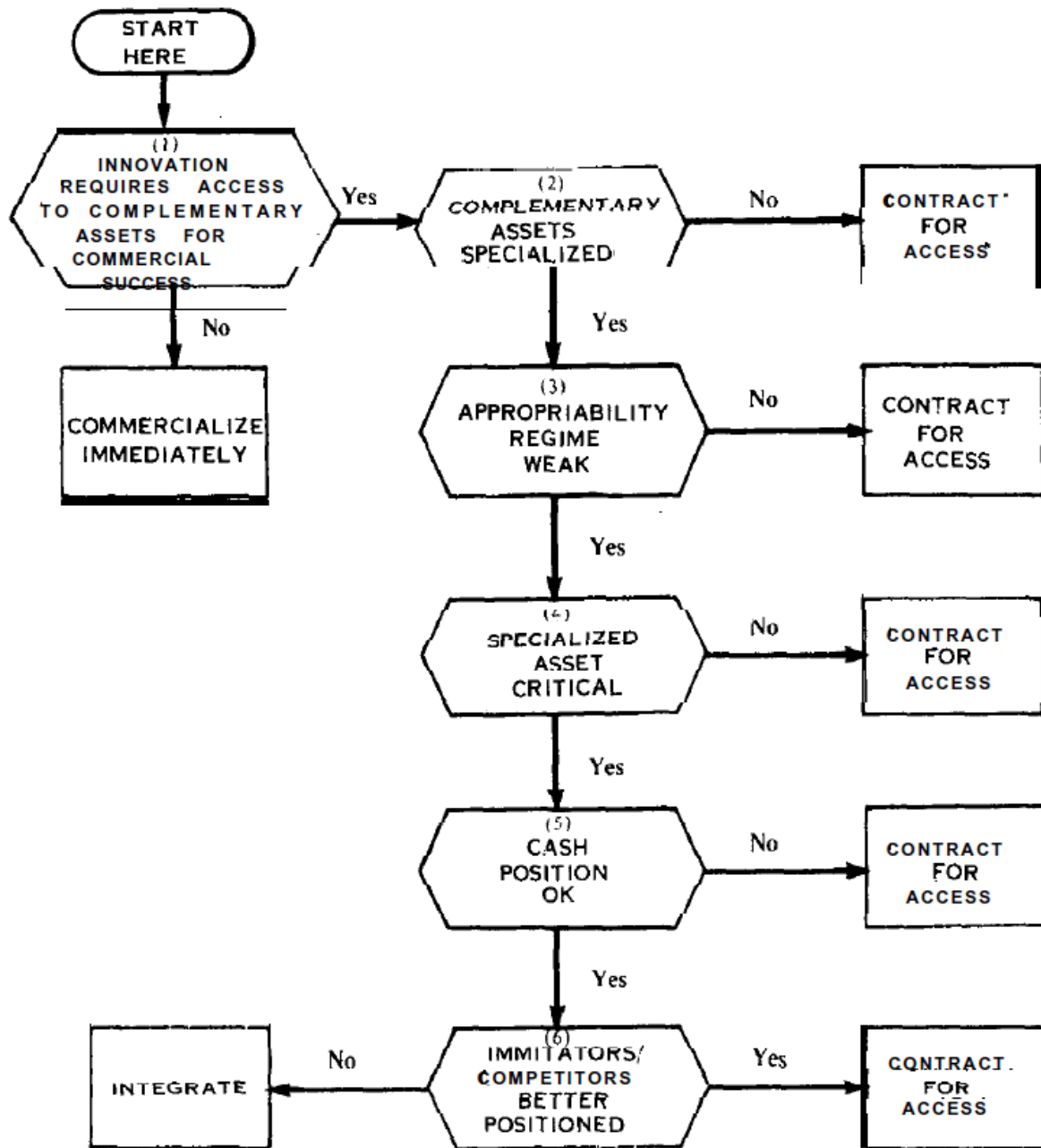
Platform: A standard for the hardware of a computer system, which determines what kinds of software it can run.

Strategic patenting: Patenting with strategic purposes

Top Dog: Asserts dominance and forces rivals to back off.

8. Appendix

Appendix 1.



9. Reference list

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