# Dynamics in Mobile Ecosystems

*A Closer Look at the Mobile Industry and its Supportive Functions*

**Authors**:
Ena Kotaranin
Steffen Olofsson


**Supervisors**:
Magnus Johansson
Benjamin Weaver

**ABSTRACT**

The main purpose of this thesis report is to examine the theory of ecosystems within the mobile industry and to create a framework that makes it possible to comprehend and manage the value creation in a practical setting.

The theoretical part is characterized by mobile ecosystems since they are considered as a fast pace sector where new innovations are ruling the market. Due to these circumstances, the research question is directed at exploring how these ecosystems can look and function. With this in mind, the choice of exploring the B2B tool developer market of the mobile phone ecosystem was made, since it is a new and growing market ruled by innovations within the app economy.

To be able to achieve this goal and to accomplish a link between theory and practice, a case study has been made on the mobile industry including several companies from the B2B tool developer sector. The research purpose is the identification of their roles among the other players in the ecosystem, services and challenges, and an examination of where the profit will migrate in the future. The case study research enables the report to discuss the challenges and future prospects for these B2B developers. Additionally, by teeing the theoretical research with the empirical findings, conclusions can be drawn on how to manage this industry in the future.

The thesis report has concluded that the old way of using mobile services is superimposed by a new ecosystem relying on content creation by outside complementors. These complementors have gone from applying more of a vertical value chain and more or less developing most functions of the application in-house, to nowadays striving in the opposite direction. The modular market's importance to platforms is evident as the support many of the key functions in generating value for end users. Because of this, an increased amount of funds are moving further down the funnel of the ecosystems.

The predictions from the empirical material indicated a trend in consolidation. Most of the financial input is coming from enterprise developers and not small independent ones; therefore larger enterprise developers will be the ones financing the future application development tools.

*Keywords*: *Business ecosystems, B2B tool developers, application development tools, SDK, telco, OEM, app, and consolidation.*

**PREFACE**

The authors of this thesis would like to start off by saying a few words. As many readers probably know, writing a master thesis is often times very hard and extremely time consuming. The work with this thesis has been a real experience, often requiring long days and extensive discussions. It has been an educational experience that will forever be cherished and remembered as "the end of the beginning" in the authors' careers. One can only hope that this thesis is a contribution of valuable insights to this particular subject.

The authors would like to acknowledge some persons whom have contributed with their kind help and knowledge in the making of this thesis. Primarily, a big thank you goes out to our two supervisors Benjamin Weaver and Magnus Johansson along with the CEO of Vision Mobile, Andreas Constantinou. Further, the authors also want to thank other individuals whom were a part of this project and a special acknowledgement to all the respondents that have partaken in this thesis, for giving their time, knowledge and effort throughout the interviews.

Without your knowledge and help this would not have been possible.

**TABLE OF CONTENT**

**LIST OF FIGURES AND TABLES**

*LIST OF FIGURES*

*LIST OF TABLES*

**LIST OF APPENDICES**

# 1. INTRODUCTION

The introductory chapter of this thesis report will provide the essential background information on the chosen research subject in order to deliver better comprehension of the report. Additionally, it will define the range of the study being made, frame the research question and purpose, and describe the outline of the thesis.

## 1.1. OVERVIEW

When the word ecosystem comes to mind, many would probably think of the ecological processes that constantly occur on our planet. Plants and animals coexisting make up the quintessential ecosystem as they rely on each other for further survival. What we see in nature can be paralleled by many of the interdependencies in human everyday life. Today, some of the industries we regularly come in contact with are part of larger networks that jointly try to create and capture value from customers. This relationship between companies and customers can be called business ecosystems.

A business ecosystem is a community where objects within the same industry occur as an integrated unit. It can be considered a practical element of a community maintained by cooperating individuals and organizations. This environment generates products valuable to the members of the ecosystem, i.e. the customers. There are other stakeholders besides customers involved in the ecosystems, such as suppliers, producers, and competitors. These are referred to as member organisms of the business ecosystem that intertwine their capabilities and functions and have the habit of aligning themselves with the guidelines created by leading companies in the business. Even though these leading companies might transform over time, the leader of the ecosystem's role is esteemed since it allows the members of the ecosystem to reach for a joint vision in aligning their roles and investments. (Moore, 1996)

The usage of ecological metaphors in order to define business structures has become more popular in the information and communications technology (ICT) business. Here, an ecosystem can often come in the form a central platform connected to a number of complementors. A well known example of this is Microsoft and how they introduced their operating system Windows, which later became the number one choice among desktop companies. In this case, Windows was the platform and was complemented by products from Microsoft itself, such as Word, Excel, Outlook etc (Gawer and Cusumano, 2002). However, over the last few years, much attention has shifted from desktop computing to handheld devices, i.e. smartphones and tablet computers. Tasks that used to be confined to PC's, like e-mailing, browsing the internet or entertainment, can now be performed virtually anywhere. At the forefront of this new way of mobile communication are Apple and Google. Just like Microsoft, they both run their own operating systems (or platforms) but do so in slightly different manners.

## 1.2. PROBLEM DISCUSSION

The platforms within the mobile industry have evolved to be very dependent on complementors. Much of the content users access on their smartphones today is created by someone else than the company supplying the platform. In the case of Apple and Google this means the creation of applications or 'apps'. These applications range from everything from games to social media and many of them are used on a daily basis. The parties that develop applications are also somewhat varied, with single enthusiasts on one extreme and large developer companies on the other.

Along with the growing popularity of creating applications and potentially reaping great rewards, comes a demand for services that simplify the creation process. Today there are a large number of companies that offer sets of tools designed to help developers create applications. These tool companies are often referred to as

business to business (B2B) developers as they cater the needs of other developers rather than end customers. Many application developers use several of these tools for each application. Given the importance of applications to the mobile platforms, these tool companies seem to be playing a crucial role in each ecosystem. Without them, content would probably not have been able to be created by such a variety of developers.

In spite of these tool companies' importance to the ecosystems as a whole, little theory seems to explain how they operate in relation to each other and their constituents. Additionally, with the dynamic nature of the mobile industry, the tool companies' future is still unsure but might be clarified by some of the existing theories.

## 1.3. PROBLEM DEFINITION

The specifics of ecosystems and how they actually work are still rather unclear. At this point, the careful reader might have grasped the fundamental parts of an ecosystem and that companies interact within them. There are however several more dimensions that need to be explained before a sufficient understanding of a business ecosystem can be attained. With this in mind, and the provisions explained in the problem discussion, we have defined our main research question:

- *What are the dynamics of ecosystems within the mobile industry and how do participants in these ecosystems interact?*

To emphasize that much focus will be put on companies providing tools for developers, a sub-question has been formulated:

- *Who are the most important players that support the fundamental parts of the ecosystem and how do they operate?*

**1.4. PURPOSE**

This thesis is aimed at providing a theoretical model over the existing theories on ecosystems and explains how companies in the beginning of the value creating process operate. Based on this model and the empirical findings, the authors will also provide some predictions on the future of this industry and how these companies will evolve. Given the technical nature of mobile ecosystems, some of the conclusions reached in this research may be applied to other kinds of ecosystems relying on similar structures as that of mobile.

**1.5. THESIS OUTLINE**

The thesis contains eight chapters, with the introduction in the first chapter. The second chapter outlines the methodology of this research. The third chapter presents and discusses the business ecosystem, the mobile industry, two-sided markets and value chains. The fourth chapter presents the empirical findings of the study. In the fifth chapter the global context of the mobile application ecosystem is discussed in the light of the mobile industry. Finally, the sixth chapter comprises a conclusion of the empirical findings. Additionally, references and appendices will be found in chapters seven and eight.

## 2. METHODOLOGY

This chapter will provide the research methodology and show how the information was used and analysed in the thesis. In other words the chapter will show how the collected data was composed, found and analysed. The research design of the thesis is explained and motivated based on the results wanted. The aim with the research investigation is to accurately frame the problems of this thesis and explain the concepts around it along with the discovery of ideas and insights of the area. This chapter will also deliberate how the empirical material is presented and analysed.

## 2.1. STRUCTURE OF THE THESIS

The initial part of the thesis consists of an introductory chapter designed to give the reader some background on the subject and explain the reason for examining this particular area. Some examples are also presented to put the mobile industry in perspective to other industries.

In the theoretical chapter, focus is put on understanding the entire structure of ecosystems within the mobile industry, starting with a theoretical overview of the ecosystems, moving towards a description of its constituents as well as common dynamics. The material used in this section is collected through published articles and textbooks. A model and framework is presented towards the end, which will provide the basis for the structure of the empirical and analytical section.

Adhering to the structure of the framework, the empirical section will start off with a look at ecosystems in general and move all the way down to tool providing companies. The wider [macro] examination of ecosystems in general is made through studies of Internet sources and texts while the narrower [micro] study of tool providers is achieved through interviews.

Finally, the analysis and conclusion of the empirical material are presented based on the theoretical model and framework. Many of the key points illustrated in the framework are here presented as headers for each topic. This is to reconnect the reader with the theory presented in the former part of the thesis and give the chapters some structure.

## 2.2. RESEARCH APPROACH

The main concern of a research approach is to answer the research question of the thesis in the form of the gathered data. The implementation of the most appropriate approach is crucial in order to create a steady foundation for the thesis. (Bryman & Bell, 2007)

According to Bryman and Bell (2007) a research approach can be categorized in three different ways; the inductive, deductive and abductive approach. The latter is a mixture of the inductive and the deductive approach and was chosen as the most appropriate method for this research. The chosen method was found most suitable since it allows a focus on the theoretical part of the thesis and goes on to understanding and connecting these theories with the collected empirical material.

The thesis started out as more of an abductive ambition as the aim was to explore ecosystems and their dynamics. In analysing the results, the authors have looked at a few existing theories in the field of strategy to form hypotheses, collect data and compare to the findings, much like a deductive research approach. The inductive part of the thesis is constructed in the analysis and the conclusion section where some of the empirical findings are intertwined with the theoretical part and the rest is used to grasp a tentative hypothesis as per the research problem and give inductive arguments. Considering the fact that a combination of the two approaches is used and that the industry is under constant and rapid change, it may not be accurate to define the method of the thesis in only one of the approaches. A more fitting description according to Bryman and Bell (2007) would therefore, and as

already explained, be an abductive method since it combines elements of both the inductive and deductive methods. (Bryman& Bell, 2007, p.164)

The choice of theory can be described as an iterative process as more and more was learned about the mobile industry throughout the first weeks of research. The authors did however, at an early phase, establish that the industry would be easiest to describe from an ecosystem point-of-view as there are many similarities. After looking closer at processes within ecosystems, further theory could be found that helped to explain the more intricate processes that occur within them. Eventually, a framework and model was constructed based on all the streams of theory found.

The theoretical framework of the thesis is structured in macro- and micro-levels, with ecosystems and two-sided market on a macro-level and value chains and value chain design on micro-level. This is connected with the empirical material, which can also be viewed in the same way since it opens with an overview and background information of the telecom industry and later goes on to a micro-level where B2B tool providers within the telecom industry have been interviewed. This method helps the authors to find problems by allowing the researchers to shift between theory and empirical material. (Alvesson&Sköldberg, 2008)

## 2.3. RESEARCH PHILOSOPHY

To be able to answer the research question of the thesis it is crucial to choose the most suitable research design, and in order to do so it is appropriate to have the right research philosophy. According to Bryman and Bell (2007), there are two research philosophies called the epistemological philosophy and the ontological philosophy. The focus will be on the former. The epistemology philosophy is a study, which refers to various ways of obtaining knowledge and belief. This philosophy contains two parts: positivism and interpretivism. The first part, positivism, examines social reality, in other words, how the social sphere can be studied as natural science. The second part, interpretivism, refers to features like norms,

values, and the subjective position of the researcher, which is crucial for understanding reality. (Bryman& Bell, 2007)

A connection is made by Crowther and Lancaster (2009) between the deductive research approach and the positivism paradigm since it is founded on the idea to reach at the precise situation, and contains hypotheses to verify assumptions. The inductive research approach is connected to the interpretivism paradigm because it is based on a precise idea to generalize the situation according to the research subject, and it lets the researcher form a subjective way of thinking around the research subject through different real life instances.

This thesis adapts an epistemological philosophy since it intertwines existing knowledge in form of a theoretical view presented in chapter three, with the empirical findings of chapter four. It entwines the beliefs created through the existing knowledge, i.e. the theory about business ecosystems and industries' modularity, with the empirical findings that have been obtained from real players from this specific ecosystem; i.e. companies within the industry of B2B tool developers.

### 2.3.1. RESEARCH DESIGN

According to Bryman and Bell (2007, p. 39) there are five types of research design, experimental, cross-sectional, longitudinal, comparative design and case study. The general design of the research method in this thesis can be described as a cross-sectional one as the authors approach the data gathering in multiple ways (Bryman& Bell, 2013, p. 65). The cross-sectional research design includes data gathering on several cases (which in this case is an industry, but several companies are being interviewed) at a time. This is to be able to gather a frame of quantitative data with at least two variables that are observed in order to discover a link (Bryman& Bell, 2007, p.55). The largest part of the data has been collected through a set of structured interviews. These interviews have been performed through

16

different media such as over the phone, over Skype, in person, and through mail correspondence. The interviews have been based on a prepared set of questions composed by the authors. To be able to apply the findings in a more general context, the authors have included some questions that are directed to issues more on a macro-level rather than just the target company. Even though the interviews were based on a set of ready-made questions, the verbal discussions with companies have naturally garnered more elaborate answers, as the authors have been able to ask any necessary follow-up questions and adapt the interview in general to what the interviewees are answering.

## 2.4. QUANTITATIVE AND QUALITATIVE APPROACH

A research consists of two principal approaches: the quantitative and the qualitative approach. The first method mentioned, the quantitative approach emphases on collecting number data, whilst the other method, the qualitative approach concentrates on gathering data in the form of words and graphics (Bryman & Bell, 2007). The chosen approach for this thesis is the qualitative, since the majority of the empirical findings are collected through interviews and not through financial data.

The qualitative approach is defined by Backman (2008) as an alternative to the traditional approach, where one considers the surrounding reality as more or less objective, is that one sees it subjectively. The reality is therefore an individual, social and cultural construction. The interest is shifted to how humans perceive and interpret the surrounding reality, unlike the scientific tradition, where one observes, records and measures a given reality, i.e. one separates the individual from the surrounding world and aim for an objective explanation, through theories and hypotheses.

The qualitative approach gives a deeper understanding of the industry's perception of the respondents. Since the empirical material consists of interviews based mostly

on words, the qualitative approach is the most suitable method to label this research. Subjectivity, being able to gain access to inside knowledge, and being able to connect with the inside reality of human beings are the main problems in this research. Another aspect of why the qualitative approach has been chosen is that a close approach is highly desired with the respondents, and in order to be able to fulfil this desire, only a qualitative research approach is possible since in the quantitative approach the researchers are detached from their subject and might not even have contact with them.

However, Bryman and Bell (2007) aim some criticism to the qualitative research approach, regarding the subjectivity of the method, saying that the method is hard to duplicate, very subjective and lacks of transparency. Notwithstanding, the authors find the qualitative method to be more suitable for the data gathering since it provides a more thorough review of the attitudes and perspectives of the respondents in the industry.

## 2.4.1. CASE STUDY – THE MOBILE INDUSTRY

The qualitative research approach shows a certain predilection for case studies. Yin (1989, p. 23) emphasizes a case study through following definition:

*"Investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."*

This contextual approach also means that one sometimes encounters difficulties in determining what actually is a case (Yin, 2003). Examining ecosystems requires a fairly large focus as they often can involve several companies and stretch over multiple industries. The choice has therefore been made to treat the information gathering as a case study. The unit of examination will be the mobile industry as it represents a fast moving technological industry where innovative solutions

constantly are introduced. The latest addition to this industry is the tool provider market, which is a supportive function of application development. This market is made up of a multitude of tool providers, also known as B2B developers. These will be further explained in the empirical chapter.

The case study in this thesis has been made in the form of a single case approach since it is the mobile industry that is being examined in an ecosystem context (Yin, 2003). The aim is to observe the present conditions, circumstances, and challenges of mobile ecosystems and also look at several representative tool-developing companies within the B2B sector of the mobile phone industry. These tool-developing companies are mostly small and new, and offer extensive technical knowledge, service and development solutions to its customers. The interviewed companies are acting only in the B2B market and work mainly with application developers.

The primary information gathering is constructed in the following way: different companies within a special industry have been interviewed to be able to see characteristics and challenges in their industry. In this thesis it is the B2B developers in the mobile phone industry that have been selected for interviews, i.e. tool providers for application developers. Out of about 50 companies that the authors reached out to, seven companies were willing to be interviewed or answered questions over e-mail. The fact that these companies are specialized in various tools, gives the research a diverse sample group that will help the study reach its goal (Bryman& Bell, 2007).

## 2.4.1. GATHERING OF DATA

The empirical data in this study was collected through a set of different activities aimed at mining sources connected to the online environment. The Internet naturally had significant influence on this process as many articles and factoids on the subject are published online. By looking at developers' activity online, a deeper

understanding of the dynamics of the mobile industry might be achieved. This means taking a closer look at various websites and forums connected with the application development where opinions and attitudes of developers can be observed. Being aware of current trends in the developer community might help to nuance the rest of the empirical data collected and in that way improve the analytical part of the thesis. Furthermore, it may provide a source of qualitative data to complement the more established sources of information.

The data gathered for this thesis can be split into two categories: primary and secondary data. The primary data is referred to the data the authors gather themselves through interviews with companies within the B2B tool provider sector. The secondary data is the data collected through research by others, such as the theory and information that have been used for this thesis. The secondary data was gathered through the regular and web-library of Lund University, and publications by VisionMobile, International Telecommunications Union, Gartner and Nielsen. In other words, the secondary data of the thesis was collected through academic articles, textbooks, and industry reports and web pages, whilst the primary data was gathered through interviews via Skype, mail and in-person meetings.

Given that the modern mobile industry has not been around for much long, the scope of the research stretches from approximately 2007 to today. This has also made it more difficult to find credible sources when researching, since there are not a lot of printed sources available on mobile ecosystems and value chains since 2007. In order to find accurate data, all industry related reports and web pages have been stripped from speculations, statements without sources, and subjective opinions. In order to make the macro-level theory accurate and reliable, original and the most updated sources have been used to the greatest extent to increase validity.

Given the chosen approach of gathering data, the authors have constantly made efforts to increase the validity of the results. The authors have therefore tried to target companies within the most popular segments of tool providers and also used

the same metrics when comparing them. This method of triangulation enables the authors to cross-check data from multiple sources to search for regularities in the research data (O'Donoghue&Punch, 2003). By taking a closer look at several players within this particular business, the authors are also able to draw conclusions about how successful companies operate within each segment. This gives the research a higher reliability as the authors apply the findings made on rest of the industry.

## 2.5. INTERVIEW METHOD

The chosen method for the interviews is the semi-structured one. One reason behind this choice is the purpose to analyse the future of the tool developer market, which makes this method very suitable for the composition of the interviews in this thesis. The methods of composing interviews are several and according to Bryman and Bell (2007, p. 213) there are twelve different ways to proceed (among them are structured interviews, semi-structured interviews, focus groups etc.). The choice for a suitable method was between interviews with the desired companies or focus group studies.

Since the relevant companies in this study are mostly based in San Francisco and the researchers are in Lund, Sweden, a focus group with all the relevant companies was excluded, and interviews via Skype was the obvious way to go. Another reason for choosing to do interviews instead of a focus group study was that the outcome of focus group studies could effortlessly be manipulated, since the participants can easily be influenced by each other and therefore tailor their answer after the other participants (Bryman & Bell, 2007). This is a highly unwanted outcome and was therefore excluded as a data gathering method. According to Bryman and Bell (2007) another problem with focus group studies is that it takes much more time to execute and it also reduces the control of the researcher along with difficulties to examine and arrange the outcome of the study. The semi-structured interview method however, allows prearranged questions along with deeper interviews and

follow-up questions. Since the goal of the study is to mainly find out how these companies work and where they see their business going in the future, it is most convenient to engage them in the same set of questions. This method will make it easier to compare the answers and compose an empirical analysis. It will also allow a free discussion with the respondents that lead to a greater understanding of their work and knowledge.

An important issue to be dealt with while interviewing has been to explain to the respondent why this information is desired and how it is going to be used. This has been clear in the e-mails sent out to the companies and also during the actual interview. To be able to get rich and broad answers from the respondents, full anonymity has been offered, which can make some respondents feel more comfortable answering the questions. Of all of the seven companies interviewed, there was only one that wanted to be anonymous, which the authors have respected by not giving away their name. (Bryman & Bell, 2007)

In the table below, an overview of the participating companies, their respondents and interview approach, is illustrated. All of the participating companies come from the same industry and have answered the same questions (Appendix 1), but through various interview types, such as video calls through Skype, in-person meetings and e-mail-interviews. Since the majority of the chosen companies for the study are situated abroad, the most suitable interview approach was video calls through Skype, which was the next best thing to in-person meetings. All of the interviews were performed in English except the one with Nohau, since it is a Swedish company, which was translated by the authors in retrospect. As illustrated in the table below, there were some follow-up interviews made approximately a month after the first interview to examine interesting statements made during the first interviews by the respondents.

| B2B Tool Provider Company | The Respondent's Name and Role in the Company | Interview Type | Date |
|---|---|---|---|
| | | | |
| Appcelerator | Gabriel Tavridis, *Director of Product Management* | Skype video call | April 24th and May 13th, 2013 |
| BugSense | Panos Papadopoulos, *CEO* | Skype video call | April 18th and May 13th, 2013 |
| iBuildApp | Rafael Soultanov, *CEO* | Skype video call | April 16th, 2013 |
| Nohau | Mikael Johnsson, *CEO* | In-person meeting | April 23rd, 2013 |
| Transifex | Themis Savvidis *Web Developer, Data Analysis* | E-mail | April 16th and May 8th, 2013 |
| AppFigures | Ariel Michaeli, *CEO* | E-mail | May 10th, 2013 |
| Anonymous Alpha | Anonymous | E-mail | April 16th, 2013 |

Table 1. Overview of the participating companies and interview approach.

The interviews were all recorded and transcribed by the authors shortly after they were made to avoid any misinterpretations (Bryman & Bell, 2007). The questions were not sent in advance to the participating companies in order to achieve honest answers and to open the possibility for discussions during the interviews. This does, however, not concern the interviews performed through e-mail, since all of the questions were sent at once with the option of follow-up questions to achieve the same level of detail as the Skype and in-person interviews. The prepared questions for the interviews were basically the same, with some small adjustments for each

company being interviewed in order to maximize the outcome of the interviews since every participating company offers a different set of B2B tools.

## 2.5.1. RELIABILITY AND VALIDITY

The participating companies in this study are all engaged in different B2B tools in order to get multiple perspectives for the empirical material and to increase the reliability and validity of the primary data gathered.

As mentioned earlier in this chapter, the goal was to interview a larger number of companies within the B2B tool industry, but due to lack of interest and response from the contacted companies, only seven participated in the study. Every respondent has a different perspective on the industry as a whole and because of this the statements they have made might be biased. However, to maintain the reliability and validity of the study, some key points have been extracted from the interviews. These key points have been used to make assumptions of how this line of business is operating and how the future in the B2B tool provider industry might look.

## 3. THEORETICAL FRAMEWORK

This chapter comprises the theoretical model and framework related to this thesis. It covers previous research theories and findings, which will be distributed into three research streams. First, an overview of the business ecosystem and its analysis will be presented. Secondly, the concept and dynamics of the two-sided market will be explained. Finally, a closer examination of value chains and their different designs will be outlined. The chapter ends with a theoretical framework that ties all these streams of theory into a preliminary model of how the industry can be interpreted.

## 3.1. THE BUSINESS ECOSYSTEM

In the middle of the 20th century the modern computer business created a new path for networked business and transformed it into an unconventional ecosystem level (Moore, 2006). The model was changing from establishing the hierarchical organizations to incorporating into lightly associated, complex, and developing networks (Moore, 1998). The concept of business ecosystems was introduced in a study made by Moore in 1993, concerning business networks with regard to a biological ecosystem metaphor. Moore (1993) defines an ecosystem as a community where all stakeholders develop, support, and are prepared to follow the lead of the leading stakeholders' strategies to be able to accomplish their common vision. According to Moore (1993), an ecosystem contains numerous species that live together, influence one another, and because of this the evolution of one specie is connected to the evolution of other species. During this whole process, the ecosystem itself is trying to survive whilst fighting off outer threats. When adapting this theory on business ecosystems, Moore (1993) claims that in order to survive the new competition it requires the formation of similar business networks with a diversity of companies that share the ecosystem. Iansiti and Levien (2004, p. 31) describe an ecosystem as a network, where the stakeholders are lightly linked to each other, but with high

interactions with each other, and where the performance of each company affects the performance of the whole ecosystem. According to Iansiti and Levien (2004, p. 38) a business ecosystem differentiates itself from a biological ecosystem by having smarter players, and where leading players are able to better understand the dynamics of the ecosystem (Moore, 1996).  As Iyer, Lee and Venkatraman (2006) state that to be able to create customer value the players of the ecosystem have to join forces to access matching resources when creating relations with one another. It is important for the players to combine cooperation and competition, which they can achieve through their internal skills and the collaboration with other players, to be able to reach full capability (Iansiti & Levien, 2004, p. 35).

High interaction among the players of the ecosystem is crucial to recognize the simultaneous blend of competitiveness and cooperativeness among the key features of the players to make the ecosystem reach its full capacity (Moore, 1996, p. 11; Iansiti & Levien, 2004, p. 23).

### 3.1.1. THE FUNDAMENTALS OF ECOSYSTEMS

The difference between a market-based and a technology-based ecosystem is that in a market-based ecosystem the players deliver similar products to the customer with a competitiveness towards each other, whereas in a technology-based position the players operate in different fields, but the player that holds the intellectual property rights often benefit from this and obtain a role as the leading figure (Moore, 1998; Iansiti & Levien, 2004, p. 38).

### 3.1.2. THE PARTICIPANTS OF ECOSYSTEMS

According to Moore (1996), the participants of an ecosystem exist not only in the core business and the extended enterprise but outside it as well. The core business is comprised of directs suppliers, core contributions and distribution channels, whereas the extended enterprise cover the field of standard bodies,

26

supplier's supplier, suppliers of complementary products and services, directs customers and customer's customers. However, the participants of the business ecosystem comprise governmental regulatory organizations, stakeholders, and competing organizations that share product and service attributes, business processes, and organizational arrangements. (Moore, 1996, p. 27)

The structure of an ecosystem is comprised of a platform where the players of the ecosystem interact with each other, and where other participants generate and share value when utilizing the platform. For the players and participants of the ecosystem to better understand the structure of it, they can identify the participants and grasp their way of involving with others in the ecosystem to be able to approach resources. (Iyer et al., 2006)

When comparing the definitions of the structures of an ecosystem, researchers diverse in their way of describing the ecosystems in detail. Iansiti and Levien (2004, p. 68) refer to the central hub as a "keystone", while Moore (1993) calls it a "central contributor". However, Iyer et al. (2004) interoperate it a bit differently by dividing the central hub into three parts: keystones, dominators and niche players.

### 3.1.3. COMPETITION IN ECOSYSTEMS

Competition in an ecosystem can be divided into three bases: architecture, integration, and market management. The first two, architecture and integration describe the set of rules and limits among products, organizations, and technology, to direct coaction and sharing of competences among the players of the ecosystem. The third base is market management, which directs the method of following the transactions over the distinct limits of the ecosystem (Iansiti & Levien, 2004, p. 145). Architecture and integration of the competition in an ecosystem consist of a platform, but not a technical platform as described earlier in the text, but a platform that works as a common collaborative setting for the

players of the ecosystem. Boundaries are set out in the platform as well to manage the competences of the players. The value is generated and shared across the platform through a 'package' by the keystone (Iansiti & Levien, 2004, p. 148). This package contains of implementations and interfaces, where implementations are the platform's imperceptible component that generates exclusive problem solving methods and connecting the ecosystem's technological gap (Iansiti & Levien, 2004, p. 150). However, interfaces are the perceptible layers of a platform that works as a centre where value is generated and shared by the players of the ecosystem (Iansiti & Levien, 2004, p. 150). According to Iansiti and Levien (2004, p. 156) the keystone's challenge of preserving a strong platform is to maintain the implementations' and the interfaces' power. It is because of this the competition of ecosystems can reflect in the competition of platforms (Iansiti & Levien, 2004, p. 156).

## 3.2. TWO-SIDED MARKETS

Two-sided markets are described as economic platforms with two different user groups that share each other's network benefits. The organization that mainly generates value is called a multi-sided platform, and does this by allowing immediate connections between at least two different types of united customers (Hagiu&Wright, 2011). Operating systems are a great example of a two-sided market, where the players of the markets are end-users and developers. The benefits collected between these groups display demand economies of scale, where end-users favour operating systems consisting of more users and developers desire operating systems that can attract these end-users.
The function of the two-sided market is, as mentioned above, to link various groups of suppliers and customers. Connecting developers to end-users for operating systems is an example of two-sided markets. This method makes it possible for players from each market to enjoy the number of players on the other market (Eisenmann, Parker &Van Alstyne, 2006). The two-sided market has as the name indicates two sides: the same-side and the cross side. Because of

this, a struggle of bringing the two sides of the markets to agreement emerges for the provider of the two-sided market (Rochet&Tirole, 2006).

Just like the business ecosystem, the platform idea is an environment, and not restricted to a technological platform. Still, when talking about app stores the provider of the platform proposes a technological platform with an effort to attract as many consumers and developers as possible for the app store to reach higher profit. With the support of this example, in the ground of information and communication technology, when referring to a platform it usually means the technological platform (Gawer & Cusumano, 2002).

There are two main differences between a traditional market and a two-sided market. The first one is that value in a two-sided market occurs on both sides of the market, whereas in a traditional market the value is moving from one market to another (from cost to revenues), as a result of a different group on every side. The second difference is that the transaction volume hangs on the market structure, instead of the general fee level that is charged by the provider. (Rochet & Tirole, 2006)

### 3.2.1. THE DYNAMICS OF TWO-SIDED MARKETS

According to Eisenmann et al. (2006) the sides of a two-sided market are tied to one another and perceive network effects that arise when the value of a product for a consumer is reliant on the amount of other consumers of that product (Shapiro & Varian, 1999, p. 13). That is, the higher the number of users a network has the more value it generates for the users.

Two-sided network effects indicate that the value of the platform to an unspecified user depends mostly on the amount of users on the other side of the platform. Value within the platform increases when the platform equals demands from both sides; enters the critical mass. Eisenmann et al. (2006) bring up an

example of this in the evolving video game industry. Game developers prefer to create games for those platforms with a critical mass of players, since they require a customer base large enough to cover their programming costs. When it comes to the game users it goes the other way around, where the users prefer platforms with a large selection of games.

The network effect can also be positive or negative and these effects can occur either on the same-side or on the cross side (Eisenmann et al., 2006). An example of this can be the positive cross-side effect, where the higher the amount of players in a online game platforms there is, the more game developers it will attract. However, positive same-side network effects with a larger amount of players in the online game platform also attract other players to join the platform to enjoy the diversity of playing against more opponents. On the other hand, negative same-side network effects can also occur, which means a growth in the developer department will increase the competition between them, hence a decrease in game developers due to the competition in the platform.

Describing all these network effects, one can come to the conclusion that the dynamics of two-sided markets are rather complex. Due to this, the market provider has to be considerate in the choices made regarding strategy.

**3.2.2. TWO-SIDED MARKETS AND PLATFORM PROVIDERS**

According to Eisenmann et al. (2006) the two-sided market consists of three challenges: pricing the platform, winner-take-all dynamics, and the threat of envelopment.

· **Pricing the platform**: the platform provider's decision whether or not to charge both sides grounded on the effect it can have on the other side's increase. Generally, two-sided networks have a "subsidy side", a user group that gets very valued by the other user group called "the money side" when creating a mass of

users. The "money side" will pay more in order to get access to the mass of users. An example of this is Skype which is free when the user makes calls to other Skype-accounts, but those users who want to use Skype to call landlines and mobiles have to purchase "Skype Credit".

· **The winner-takes-all dynamics:** the platform provider has to make a decision regarding sharing the platform with competitors or to "fight to death" as Eisenmann et al. (2006) like to describe it. The platform provider has to angle the market in his own favour to make the platform a popular common ground for the public. The authors bring up an example of Sony's useless fight to establish a new videocassette standard, Betamax. For the platform provider to be able to make decisions regarding these kinds of issues, he could consider "multi-homing costs" that are high for at least one user side. The term "homing" means that the user could be on one or more platforms if they choose or prefer it. When the costs get high, the platform provider needs to ensure that the vulnerable side of the platform stays there through various initiatives. These initiatives can be: building a good reputation through previous experience, building solid relationships, and improvement of the platform with newer technology.

· **The threat of envelopment**: threats from rival platforms are bound to happen if the platform utility is delivered by a more dominant platform and as a fragment of a wrapped parcel, which can indicate that the platform users can pay a lower price for the same features. Because of the vague market lines of telecom markets, a risk like this does very much exists, which leaves the platform provider with two options; to sell out his own part to the dominant platform or to solve the problem through innovative strategies. (Eisenmann et al, 2006). An envelopment example is mobile phones, where products grow to embrace functionalities of other products on the same market. Today mobile phones include everything from music to Internet access.

It is no news that the mobile ecosystem has been developing rapidly over the last

few years. Basole (2009) mentions the case of Apple and Nokia, where Apple launched the iPhone in 2007 and joined the mobile ecosystem, and Nokia transformed itself from a device manufacturer to a software service company. Mobile phones have developed greatly, especially over the last years, with increased capabilities and more involved content developers (Basole, 2009). However, according to Holzer and Ondrus (2010) the players of the mobile ecosystem have had a change of roles.

Not only has the mobile ecosystem changed, but also the introduction of applications has sculpted the mobile market into a new shape and structure. Along with the introduction of app stores this has led to a role change of the platform provider (Holzer & Ondrus, 2010). In their article, Holzer and Ondrus (2010) show a model of the mobile application distribution process (Figure 1), where the application developer creates an application with the help of development tools from a certain platform and then releases it on the application portal. When this process is complete, the consumer acquires the application from the application portal, e.g. AppStore. The acquisition is managed through a payment system that goes from the consumer through the application portal till it arrives to its final destination, the developer.

Figure 1. Mobile Application Distribution Process
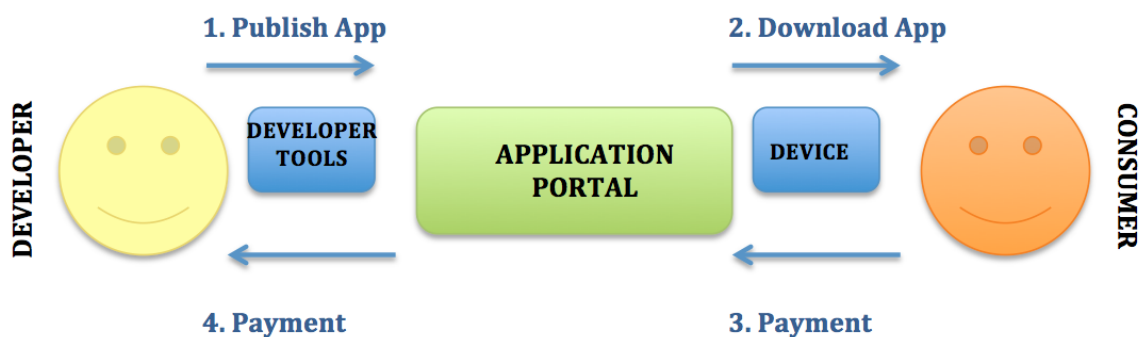


Holzer and Ondrus, 2010. p. 23.

The platform providers often choose the roles they play in the application

market. Some choose to take on full responsibility to be able to have full control over the distribution process, while others choose a slightly discreet role where they are only responsible for parts of the distribution process. The authors illustrate four possibilities of responsibility of the platform providers and identify their represented app-store providers (Figure 2).

1. Full integration: the provider has full control over device manufacturing, platform, and app sales of the app store, e.g. Apple and Nokia.
2. Portal integration: the platform provider's focus is on app development and app sales of the app store, e.g. Google.
3. Device integration: the platform provider only produces the devices, but is not running the app store, e.g. RIM.
4. No integration: the concentration is entirely on running the app store, e.g. Microsoft.

Figure 2. Platform Integration
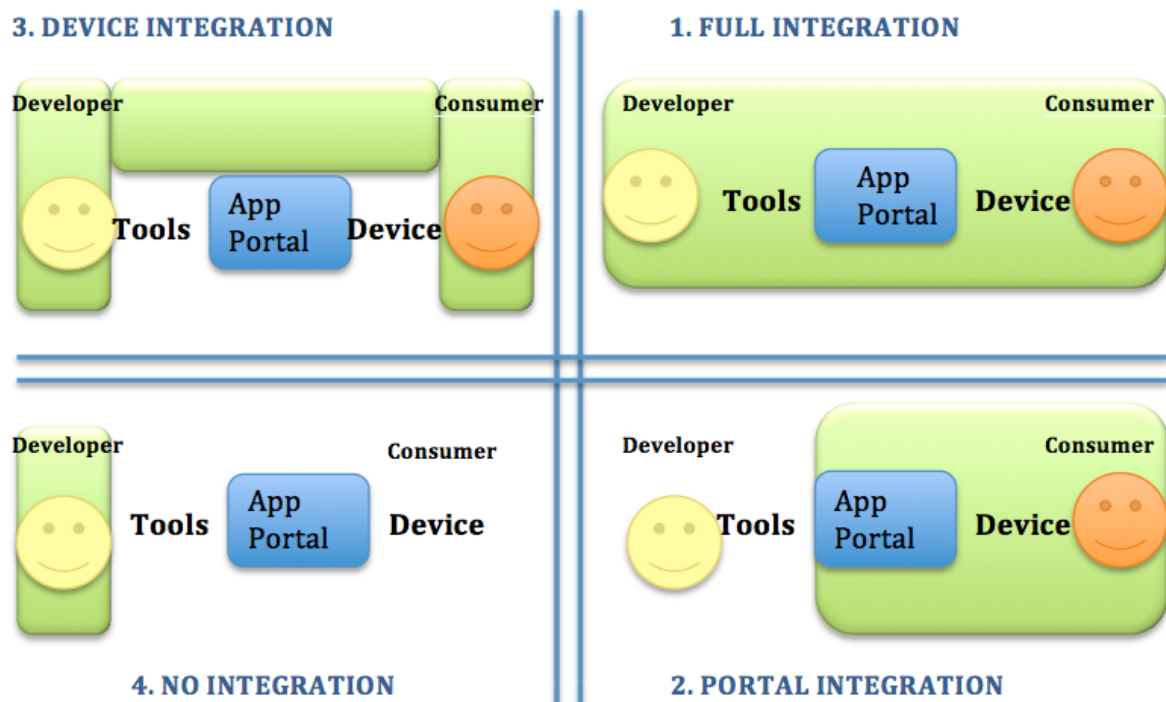


Holzer and Ondrus, 2010, p. 27.

The characteristics of a platform leader are shown in their product success e.g. when an organization's products or services develop into a foundation where other organizations market their new services and create new products (Gawer & Cusumano, 2002). Gawer and Cusumano (2002) talk about two examples; Microsoft's operating system and Intel's microprocessors, where the offering of the platform leader becomes a vital or even a dominant part of the designs within the complementary product line of the particular industry, thus earning large quantities of expectable revenues to the leader of the platform.

### 3.3. MOBILE ECOSYSTEMS

The definition of an ecosystem applies rather well to the mobile industry. The construction of networks where a multitude of companies are cooperating and coevolving is the basis of the ecosystem creation (Basole, 2009). A common approach to analysing these business ecosystems has been through the theory of value chains. This section will outline a few of these theories and try to explain their relevance in the mobile industry.

Basole (2009) describes the business ecosystem from a fairly fundamental point of view. His study is summarized in figure 3 shown below, and identifies segments that are either growing or already established in the mobile industry. Players that are emerging on the market are depicted by dark grey spheres while already established players are marked with light grey spheres. Since this study was made a couple of years ago, the distinction between established and emerging segments is perhaps not accurate anymore. Nevertheless, the model describes some of the important players and illustrates the relation they have to each other.

Figure 3. Segments in Converging Mobile Ecosystem
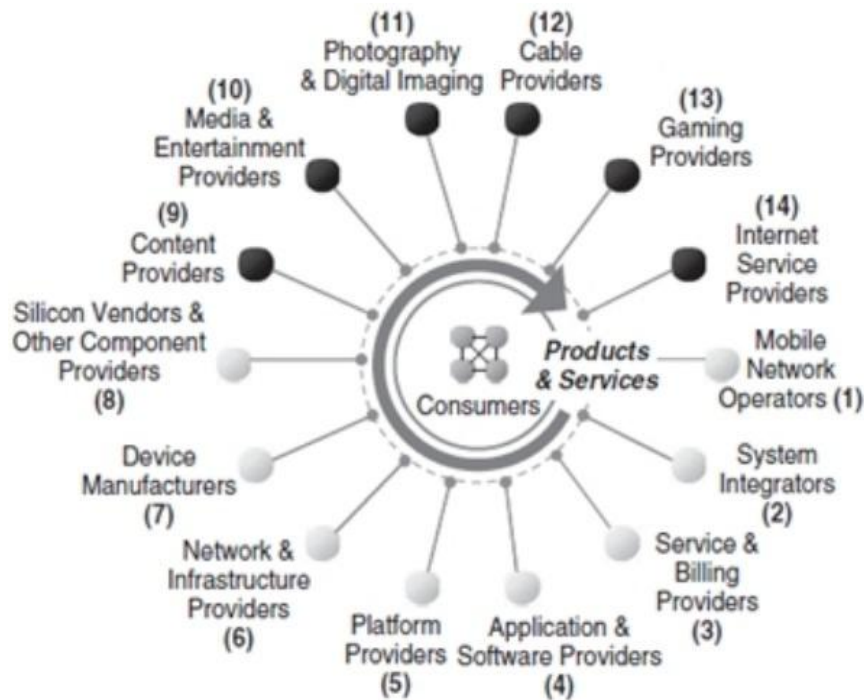


Basole, 2009, p. 55.

Another view of the value chain is presented by Barnes (2002). In his article, he identifies a few processes crucial to value creation in the mobile industry. The theory is functional in its design and focuses on activities rather than on the ones performing them. The model distinguishes between the technical and the commercial side of the value creation by having one side describing content and the parallel side outlining the infrastructure and service

Figure 4. Parallel Processes



**Content**

**Content Creation**
- Creation of control, inc:
-text (news, stock prices)
-audio (voice, music)
-graphics (photos, logos)
-video (movie, cartoons)
- Content firms, inc:
News, designers, music, studios, photographers, writers

**Content Packaging**
- Processing digital content for consumption – formatting, editing, customising and combining
- Value added mobile sites, e.g.:
-Finance
-Travel
-Games, News

**Market Making**
- Content and service selection:
-Communication (email)
-Personal content and alerts
-PIM "filofax" functions

- Mobile portals, inc.:
-telcos
-webportals
-entrants

**User/ consumer**

**Infrastructure & Services**

**Mobile Transport**
- Transmission technologies (GSM, GPRS, EDGE, UMTS)
- Technology suppliers (Ericsson, Siemens, Nokia, Motorola, Lucent)
- Network operators (Vodaphone, NTT DoCoMo, Telia)

**Mobile Services & Delivery Support**
- Mobile service technologies (SMS, iMode, WAP, SAT)
- Internet connection and server platform (WAP gateways)
- Payment systems (SIM-based e-cash, Pay-by-GSM)
- Security (WTLS, PKI)

**Mobile Interface & Applications**
- Microbrowser (UP browser, Compact Netfront)
- PDA OS (Windows CE, PalmOS)
- Application Development (WHL, cHTML, VXML, SMS)
- Authoring tools (UP SDK)
- Device vendors (Nokia)

Barnes, 2002, p. 93.

A third approach to the value chain theory is presented by Karvonen and Warsta (2004) and concerns the mobile multimedia development. Their theory is based on Barnes' (2002) idea of the value chain presented above, but focuses more on specific technological components. Rather than defining activities in general terms, Karvonen and Warsta identify more specific value chain components that are related to the mobile industry and that each network member needs to consider. These components are defined as decisions about operating systems, development platforms, terminals and networks.

Figure 5. Technical Value Chain Process
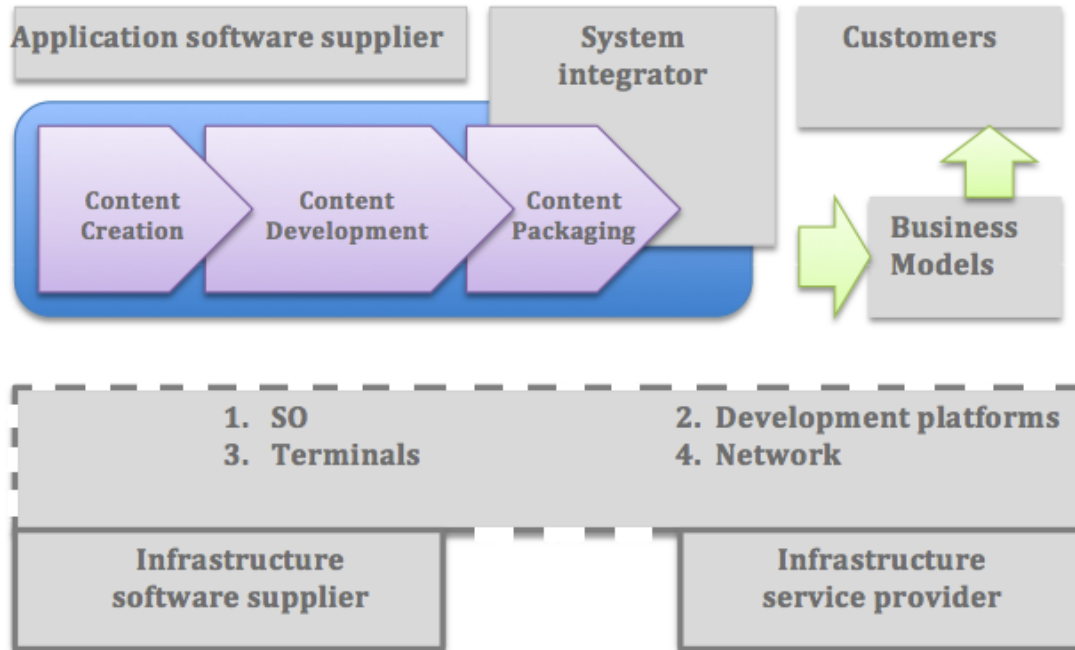


Karvonen and Warsta, 2004.

## 3.4. VALUE CHAIN DESIGN

Clockspeed is defined by Fine (1998) as the rate an industry grows in products, processes and organizational change. Fine uses the analogy of fruit flies and humans to describe differences in the lifetime of different industries. Some industries, often technically advanced, have higher clockspeeds than others; much like the mobile industry is a faster moving industry than the agricultural industry.  Within these "fruit fly industries", Fine (1998, p. 213) stresses the importance of supply chains. He says:

> "The ultimate core competency of an organization is "supply chain design,"
> which I define as choosing what capabilities along the value chain to invest
> in and develop internally and which to allocate for development by
> suppliers. In a fast-clockspeed world, that means designing and redesigning
> the firm's chain of capabilities for a series of competitive advantages (often

*quite temporary) in a rapidly evolving world."*

It is highly important for companies to understand the dynamic processes of a clockspeed industry in order to develop values that will assist them in leading their own options in the value chain. Understanding these dynamic processes helps companies develop principles to guide their own choices in the value chain. In addition, by observing dynamic processes in the evolution of industry structures, firms can also develop insights into how an industry's future may unfold. The greatest rewards go to the companies that can anticipate, time after time, which capabilities are worth investing in and which should be outsourced. Also which capabilities that should be cultivated, discarded, which will be the levers of value-chain control and which others will control. Companies and individuals must learn to focus directly on two distinct sets of priorities: exploiting their current capabilities and competitive advantages while also consciously and purposefully building new capabilities for the inevitable moment when the old ones no longer provide an advantage. In tumultuous, fast-clockspeed markets, firms cannot hide behind a lock-in strategy, but must continuously develop new capabilities in preparation for the inevitable new opportunities and battles just around the corner. And, they must maintain an organization that is flexible enough to jump when necessary.

Fine (1998) further explains that the choice of supply chain design can fluctuate over time and that industries will oscillate between a vertical/integral and a horizontal/modular design. He calls this the Double Helix (figure 6) and it means that big players in an industry, that apply a vertical and integrated supply chain design will eventually choose to outsource activities that they used to do themselves, in order to be competitive. This horizontal way of working will lead to a multitude of entrepreneurs entering the market hoping to tap into the wealth that is generated by the industry. The influx of new players to every segment of the horizontally structured industry creates whole sub-industries where former (vertical) competitors now can shop around. A modular industry is however

characterized by fierce, commodity-like competition and players will eventually start to outgrow each other. Stronger players- those that offer a better price, technology, service, or quality- will eventually drive out the weaker ones. These "winners" of the sub-industries will grow until they have enough market power in their segment to integrate vertically and ultimately become one of the industry monoliths that started the whole cycle.

According to Fine (1998), as the industry's speed quickens, the possible advantages of a company might be cut down, since he states that most advantages are temporary. However, Fine's (1998) assumption might be slightly spontaneous as the development of production cycles become briefer, which means that competitors can reproduce and transfer faster into a competitive state. For a company to preserve its advantage in the industry, it is important to at the same time advance products, procedures, and supply chains.

Figure 6: Double Helix
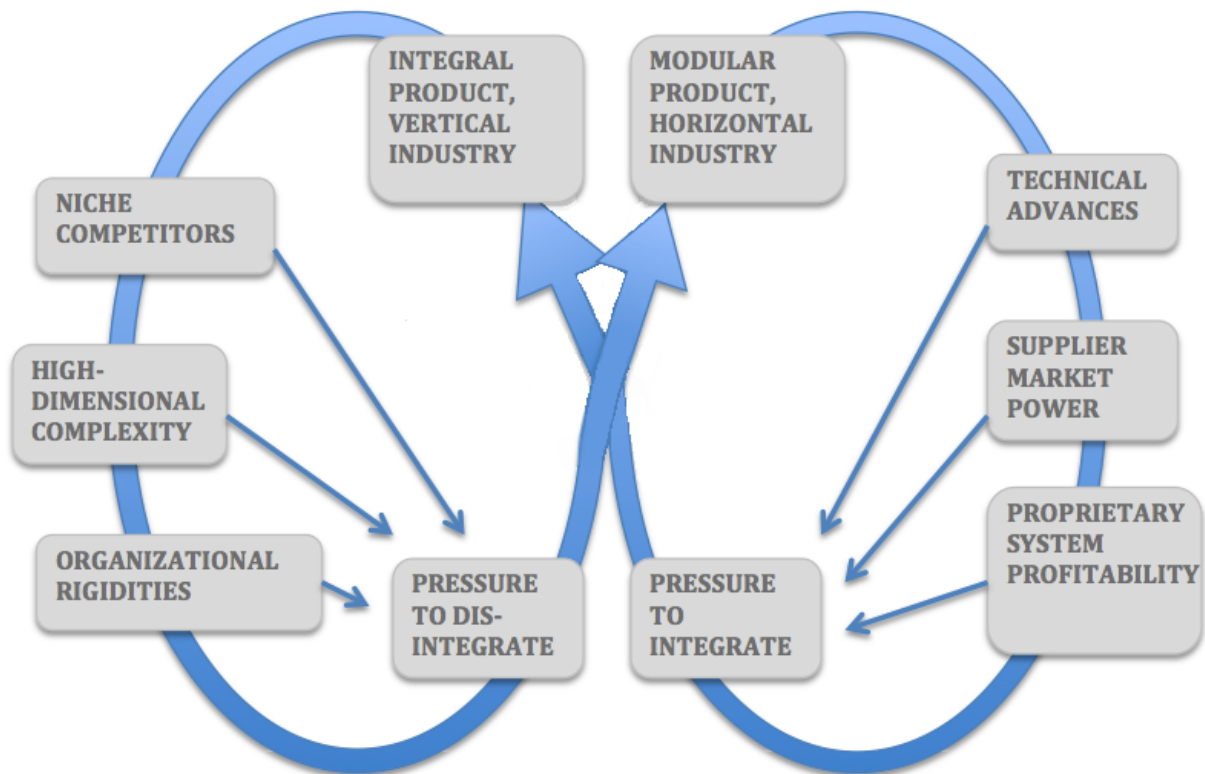
Fine, 1998, p. 216.

Christensen, Raynor and Verlinden (2001) further elaborate on the notion that supply chain design is one of the crucial competencies in any organization. At the onset, their theory seems rather clear and very much in line with what Fine (1998) claims, as they examine a market where some companies are forced to become modular in order to stay competitive. What they add to the discussion is however a model over how to predict where future profits will be. Central to their theory is disruptive technologies: When integrated companies are making technological advances that are beyond what the mainstream market can absorb, thus allowing smaller niche companies to move in and take market share and profits (figure 7). When products are not good enough, companies will focus on improving the product itself, which typically calls for an integrated way of working. As companies try to satisfy their most demanding customers, technology will eventually catch up and surpass what mainstream customers expect. Because of new entrants targeting this overserved segment, companies are forced to become modular in order to bring more flexible products that better cater to certain market niches.

Figure 7. Disruptive technologies model
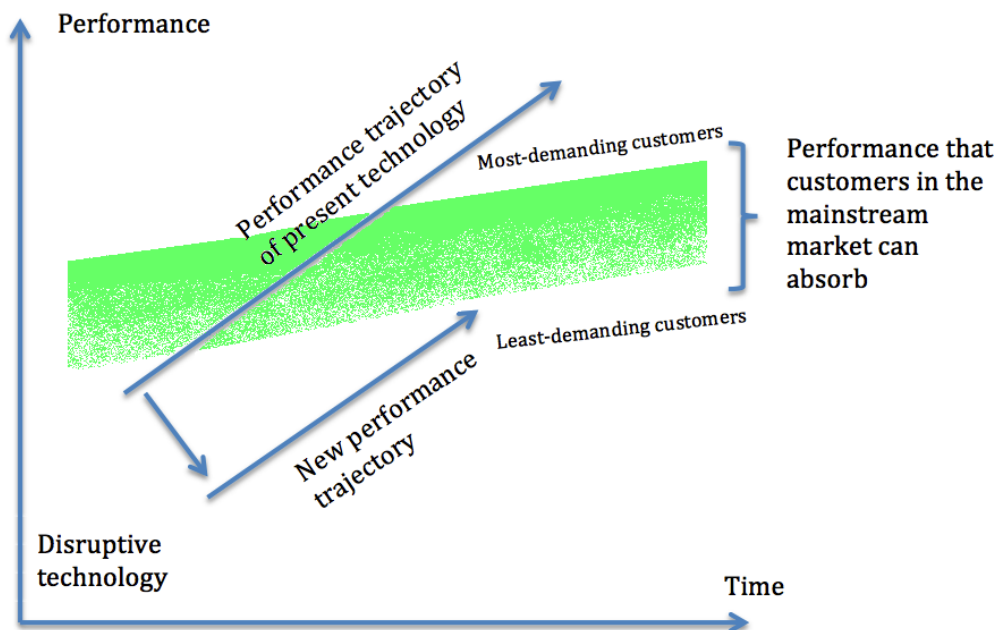


Christensen et al. (2001), p. 75.

Christensen et al. (2001) also point to the interfaces between components and subsystems as crucial to their argument. By closing the interfaces between two layers, it is possible to extract more profits. They list three conditions that must be met when procuring a subsystem:

1. Specificity – managers need to know which parts they are procuring that are crucial.
2. Verifiability – managers must be able to measure attributes in order ensure that they received what they needed.
3. Predictability – managers need to understand how the subsystem will interact with other parts of the system.

These three conditions will allow a decoupling of the value chain and are prerequisites to modular design, according to Christensen et al. (2001). Without them, sufficient information cannot be acquired and managerial coordination will reinforce the strength of integrated companies.

## 3.5. THEORETICAL FRAMEWORK

Given the properties of a technology ecosystem, where much of the knowledge needs to be disseminated throughout a network, it can be assumed to have many of the characteristics of the business ecosystem described above; a network of companies where stakeholders interact with each other and where one company's performance affects the rest of the ecosystem (Moore, 1996). Theory also points to some unifying platform allowing participants to generate and share value (Iyer et al., 2006). This platform is run by a central contributor (Moore, 1993) and acts as the basic architecture of the ecosystem. Along with integration and market management, this is what guides competition in the ecosystem through the sharing of competences (Iansiti & Levien, 2004, p. 145). The platform of the ecosystem consists of two components: the implementations, which are the layers that solve problems and bridge technological gaps, and the interfaces, which are the access points that participants use to create shared value (Iansity& Levien, 2004, p. 150). Christensen et al. (2001) also acknowledges the importance of interfaces but do so in relation to value chain design and whether or not to outsource some functions in an organization.

With technology ecosystems relying on shared information among the participants through a platform, the provider of this platform needs to connect this community with customers who will actually buy what is being produced by the participants of the ecosystem. Thus, when a platform is created, the platform provider must attract both consumers and developers of complementary applications in order to succeed (Zhu & Iansiti, 2012). The result of this, called two-sided markets, is heavily influenced by the phenomena of network effects where both suppliers and customers are attracted to a platform based on how users/suppliers there are already using it (Eisenmann et al., 2006). With two sided markets comes the challenge of pricing the platform, the winner-takes-all dynamics, and the threat of envelopment. These decisions will naturally affect participants' way of working in

that they have to adapt their revenue models and position themselves to competition from neighbouring platforms.

These provisions are imposed on the ecosystem participants by the platform provider. There are however other choices they have to make in terms of internal structure. One of the most fundamental decisions to make as an organization is that of value chains. The value chains that have been presented above by Basole (2009), Barnes (2002) and Karvonen and Warsta (2004) are all examples of value chains within technical industries. They all outline different parts of the value chain in a technological industry, in this case the mobile industry. These value chains and their constituents serve as a good foundation for Fine's (1998) model on clockspeed industries. Technological ecosystems are by Fine's standards qualified as fruit fly industries because of their dynamic properties. As industries age, companies will eventually choose to outsource their activities and become modular. Christensen et al. (2001) explain this shift towards modular designs by companies overshooting customer's expectations and letting in disruptive technologies.

Figure 8. Ecosystem model
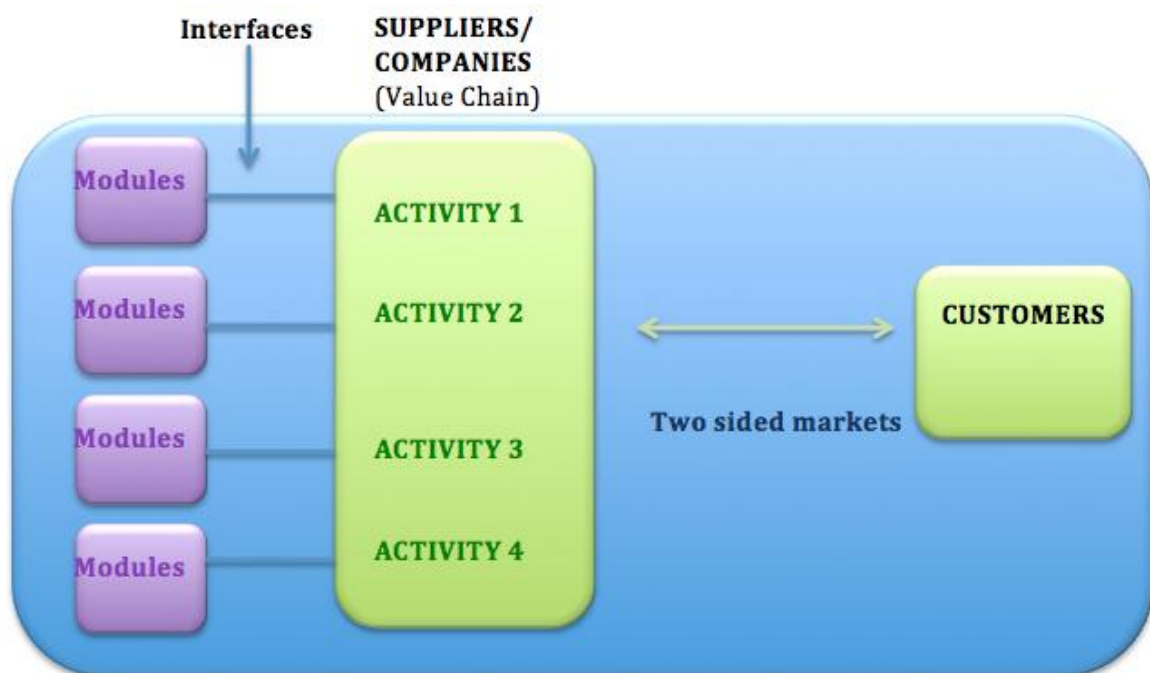
At this point, it is possible to form a summarized model that will reflect all the streams of theory presented above. The model (figure 8) outlines an ecosystem as a unit containing the producing companies and their customers. The platform in this technical ecosystem is organized in a multi-sided market. In this multi-sided market the focus will be on the company side. The company has a number of choices to make regarding value chain design, which will depend on the surrounding market environment. With this model the aim is to explain what is happening in the mobile industry and how they have gotten to where they are today. The ambition is also to make some predictions on where these industries will be in the future, based on the theory presented.

To give the reader further understanding of the model presented above, the authors have constructed a framework outlining the most important streams of theory. At its most basic form, the framework can be divided into two fields describing events on an industry level (macro) but also on a business level (micro). The framework is then split up into sub-divisions to more effectively link each theory with key points and their respective authors. These sub-divisions will later serve as the basis of discussion in the analysis chapter. The framwork (figure 9) is presented below:

Figure 9. Theoretical Framework

| | Area of examination | Key points | Supporting litterature |
|---|---|---|---|
| **Macro-level theory** | Ecosystem | Business networks<br>Collaboration / Shared value<br>Technology based | (Moore, 1993)<br>(Moore, 1996)<br>(Moore, 1998)<br>(Moore, 2006)<br>(Iansity & Levien, 2004)<br>(Iyer et al., 2006) |
| | Two sided markets | Multi-sided platforms<br>Managing users and developers<br>Critical mass<br>Platform provider | (Eisenmann et al., 2006)<br>(Gawer & Cusumano, 2002)<br>(Hagiu & Wright, 2011)<br>(Holzer & Ondrus, 2011)<br>(Rochet & Tirole, 2006)<br>(Shapiro & Varian, 1999)<br>(Zhu & Iansity, 2012) |
| **Micro-level theory** | Value chains | Creating content<br>Specific value chain components<br>Parallell process | (Barnes, 2002)<br>(Basole, 2009)<br>(Karvonen & Warsta, 2004) |
| | Value chain design | Disruptive technologies<br>Overshooting demand<br>Closing interfaces<br>Clockspeed<br>Invest vs outsource | (Christensen et al. 2001)<br>(Fine, 1998) |

## 4. EMPIRICAL MATERIAL

This chapter focuses on the collected empirical material from the secondary data gathering and interviews. The purpose of this chapter is to give the reader a clear view of mobile ecosystems and the tool vendor business within it. The chapter will start off with the secondary data which represents the macro-level information in our framework. The micro-level information is represented by the primary data gathering from interviews and will be towards the end of the chapter.

### 4.1. OVERVIEW

It was only six years ago Apple launched the iPhone, and at the same time a new, fast growing and global industry was born. In this short time, applications have reached a significant and integral role in many people's lives. Application developers are a completely new type of customer to consumer. Developers have existed in other parallel industries, like PC developers or cloud developers, while mobile application developers are a new and quickly expanding breed. In the last four years they have grown so much that they have created almost a half of million jobs within app development in the U.S. only (Needle, 2012). Apple announced that last year alone there were about 20 billion application downloads, which is the same number as in the four previous years combined (Apple Press Info, 2013-01-07). The opportunities for rapid and considerable success in the application industry have a strong appeal. The application developers that have actually succeeded are however few in relation to the thousands of developers available worldwide. This has resulted in the inception of a new market catering to the needs of developers in their creation of applications. On that note a new business within the industry has arisen for the B2B developers. (VisionMobile, 2013a)

### 4.1.1. BACKGROUND

The telecom industry has experienced some significant architectural changes with the inception of the application market. The predecessors of today's smartphones were however developed through very different channels than what are seen today. Phone manufacturers, network operators, and a few application and content providers controlled most of the mobile service development (Holzer and Ondrus, 2011). Consequently, external software developers wanting to move in on this market were at the complete mercy of the large telecom companies and any ideas for new mobile services had to be run by them before they could be realized. This was due to the fact that competition in the mobile industry was fierce at the beginning of the 2000s and processes were slower than today. Companies were in that way rigid and adapted to working with tier-1 (the old network structure). This all changed with the introduction of open mobile platforms which gave developers greater insight in the mobile operating systems and in that way enabled them to create and adapt their own software for that specific system. As developers gained direct access to the mobile platform resources, some of the old incumbents with substantial power in this industry, like the network operators, lost some of their influence. Their positions were however covered by actors offering alternative way to access material through mobile application portals.

Developers were however dispersed and there was a need to consolidate their work on one single portal. The big companies wanted a way to reach users directly in an easy, streamlined way. This used to happen via tele companies and OEMs (original equipment manufacturer). The first initiative was made in 2008 by Apple with its launch of the iOS App Store which offered applications for devices running on the iOS operating system. This enabled Apple to control the process of app development to application distribution while at the same time streamlining the service for customers and developers. This revolutionary way of offering content to customers began to tear up the existing, rather rigid structure

that companies like Nokia and Sony Ericsson still were employing. Developers could now reach the end-customer with little interference from the contracting company. Furthermore, Apple incentivized developers through a revenue sharing method, which made app-creation attractive to people other than technology enthusiasts (Apple, iOS Developer Program, 2013).

With the advent of the iOS App Store, other prominent software companies saw the benefits with this business model and started creating applications portals of their own, or as joint ventures. Shortly after Apple's launch, Google introduced the *Android Market* (now *Google Play*) and Research in Motion (RIM) announced that they were working on something that would later become *BlackBerry World*. Nokia soon followed with its own application platform called *OVI* (later *Nokia Store*). One of the latest additions to this race for a winning platform is Microsoft with the *Windows Phone Store* and *Windows Store*. The latter displays an interesting shift in strategy as it provides content for not only tablets, but also laptops and desktop systems. (Vakulenko, Schuermans, Constantinou & Kapetanakis, 2011)

The focus in the mobile industry has shifted from simply providing the best product, to also being in control of and offering the largest network of mobile services (VisionMobile, 2011). As described earlier, the once very sceptical attitude towards outside software developers has recently changed for the opposite as companies now support developers by providing them with various software development kits (SDK). In doing so, large networks or ecosystems form around the platform set up by the company, which forms the basis of the new competitive environment in the mobile industry. There is, however, a further dimension to this, as competition and collaboration exist within these ecosystems. Developers can therefore be seen as having two agendas; being successful themselves and making the entire ecosystem successful. The latter of these two is probably only likely for the most loyal developers, as developers presumably would shift ecosystem if theirs would fail.

In this paper a platform is defines as the specific operating system that a mobile device is running on. Since handset manufacturers decide what operating system they will use for their phone, consumers are more or less choosing platform by choosing what phone model to buy. Similarly, developers of mobile device software choose their platform by using developer's tools unique for a particular operating system. Today, there are five leading platforms for mobile devices: Android by Google, iOS by Apple, Blackberry by Blackberry, Windows Phone by Microsoft, and Symbian by Accenture and Nokia. The market share of each platform at the end of 2012 is represented in the table below.

Table 2. Worldwide Smartphone Sales to End Users by Operating System in 4Q12 (Thousands of Units).

| Operating System | Units sold | Market Share (%) |
| --- | --- | --- |
| Android | 144,720 | 69.7 |
| iOS | 43,457 | 20.9 |
| Blackberry | 7,333 | 3.5 |
| Windows Phone | 6,185 | 3.0 |
| Symbian | 2,569 | 1.2 |
| Other | 3,397 | 1.6 |

Gartner, 2013.

The new and evolving climate in the mobile industry coupled with the ever-increasing level of globalization is constantly opening up new fields of study for researchers. The fact that the industry is broken up into different tiers with entire ecosystems at one extreme and SDK's at the other, adds several new dimensions to the subject. This is evident when looking at how developers use these ecosystems in order to reach the global market, something that used to be controlled by the dominating phone companies.

## 4.2. A NEW MARKET

Being able to attract users to a platform is key to its survival. An important determinant for the attractiveness of a platform is its user base. Users will find the platform attractive if there are other individuals using it as well. Up until a certain point, the inflow of users to a new platform will however have to be managed and supported by the company providing the platform. When a sufficient amount of users have adopted the platform, the rate of adoption will be self-sufficient and create further growth, also known as critical mass (Rogers, 1962). Given the dynamics of two-sided markets, further explained in the theory section below, the major platform providers in the mobile industry have over the last few years had to attain critical mass in two distinct groups; developers and end-users. The two groups are interdependent in that users are attracted to platforms with an extensive assortment of applications while developers are attracted to platforms where the most users are. Thus, one of the first steps towards a successful platform can be presumed to be the ability to offer applications that can attract users, who in turn will attract more developers that create more applications etc.

The importance of having applications available to customers puts pressure on platform providers to simplify the application creating process for developers. If applications easily can be created and monetized through a specific platform, developers will naturally be drawn to that platform. It is therefore in the mobile companies' best interest to facilitate this creation by providing different tools that simplify their work. Apple has adapted well to this aspect by lowering barriers of entry for developers through their iOS SDK (VisionMobile, 2011). Other competitors like Android and Windows Phone also offer development tools for their platforms but not as user friendly as that of Apple.

Other than SDKs from the platform providers, a multitude of third party companies have begun to emerge and offer their own sets of tools. These tools range from

services helping developers to monetize their applications through ad-integration to services that provide user analytics. Since many parts of the application production process can be assisted, a lot of the technical know-how is no longer required. This means that the typical application developer has gone from being a coder to an innovator, designer and marketer. Nevertheless, applications need to be well built in order to attract buyers. Apple ensures this by imposing strict certification requirements on all applications being developed for iOS (Ibid.)

The demand for applications has spawned a completely new market of companies providing supportive functions to developers. An entrepreneur who wants to build an application can through this market access tools that cover the whole lifecycle of the application. This stands in sharp contrast to the old way of designing applications where handset manufacturers and operators had the final say. The application industry is on a steady increase with more revenues being directed towards application creation. One of the main building blocks in this new application economy is the sphere of developer tools.

However, the app development process is quite complex with different requirements such as memberships and fees. The dominant players in this market are obviously Apple and Google, which have different requirements for their developers. By comparing their two app development processes, it is able to see which one is stricter than the other. The access Google App Development one is required download an Integrated Development Environment (IDE) that lets the user write the code. Google offers their SDK (the Android SDK) free of charge for several operating systems, which in this case are Windows, Mac, and Linux. The next step is applying for membership for 25 dollars, i.e. a developer account that the applier gets accesses the second the payment is approved. Apple's requirements are however a bit stricter since their development IDE is only available for Mac, which means the developer has to work through a Mac when developing the app. When it comes to the membership, Apple has stricter requirements than Google since the fee is 100 dollars, which is a drastically more expensive than Google. Along with that, one has

to apply for membership and wait up to two weeks for Apple to approve the membership application, and it is also very possible to get rejected. (Mackie, 2013)

## 4.3. GROWTH IN TELECOMMUNICATIONS AND MOBILE TECHNOLOGY

Telecommunications and mobile technology have grown radically these last years. As the usage of technology devices people use every day become interconnected, people start to experience content across several screens where different devices complement each other. In 2013 there are 6.8 billion mobile subscriptions, almost as much as 7.1 billion, which is as much as there are people on this planet (Sanou, 2013). Market competition and modern technology are the reasons behind this expansive growth. The development of telecommunications has gone from simple call and text-making phones to complex smartphones, with features like web browsers, Wi-Fi, high-resolution touch screens and additional qualities such as GPS and social media. In recent years these phones have become drastically popular. The sale of smartphones has increased globally along with the field of telecommunications and mobile technology, with a sale of 207.7 million units by the fourth quarter of 2012, which is an estimated growth of 38.3 percent from the year before (Gartner, 2013). Gartner (2013) also expects the sale of smartphones to increase by 1 billion units within the year of 2013. This incredible growth in the sales of smartphones shows a severe modification of user-demand in this particular category. Today's users need more than just a call and text-function. They are concerned and amused by the broader variety of features of the smartphone, such as buy and install preferred applications. According to the International Telecommunication Union (ITU) (2011) by the year of 2015, the downloading of mobile applications will cover 48 billion because of increased mobile phone invasion along with growth in customer mobile application library.

Looking at ad spending throughout different media, ad networks seem to be a safe bet in the future. It is no news that advertising has been migrating from

television and papers to the Internet. Even though television is still holding the majority of the advertising money, the largest advertising increase during 2012 was the Internet, with a percentage increase of 12,1% globally, to the previous year, compared to television advertising that has only increased 7,9%. The Internet ad growth was the highest in the Middle East and Africa (35,2%), Latin America (31,8%), and Europe (12,1%). (The Nielsen Company, 2012a) Comparing the numbers from the first quarter of 2012 to the third quarter, it is possible to see that Internet advertising is increasing steady, and even though television ads are still increasing, it is far less than the Internet (The Nielsen Company, 2013). Internet advertising is getting more and more popular and the ad network figures are increasing steady for each quarter of the year. Content providers are constantly looking for new ways to generate content value, while advertisers and brands are aiming at selecting the right audience for their ads.

There are two main reasons why advertising is migrating from television and papers to the Internet. The first one is that it is cheaper (Goldberg, 2013) and the second one is that the usage of smartphones has increased (Appendix 2) and therefore also the application usage, which is a new trend in ad networks. This is not so strange since the preferred device among people is the smartphone. In the U.S. it covers 53% of the mobile phone usage, in the U.K. 61%, in Australia 65%, in Italy 67%, and the largest majority in South Korea with 67% (Appendix 2). The question now is how effective is application advertising and how often does smartphone users notice advertising on their phone? According to researches made by the Nielsen Company (Appendix 3) smartphone users all over the world are tending to receive ads approximately once a day, with South Korea on the top with the highest number, where 78% of the smartphone users receive ads daily. Contrary to South Korea, smartphone users in India receive mobile ads less often; about 39% of the users receive ads weekly and not daily (Appendix 3).

## 4.4. AN EXPLAINED SELECTION OF TOOL PROVIDERS

In order to give the reader a better understanding of the topics discussed in the interviews, a selection of tool provider categories will be explained shortly. The list of categories is not exhaustive but will provide an explanation of some of the most common tools many developers use. Much of the information on these categories has been provided by VisionMobile (2013b).

- Backend as a Service (BaaS): This category refers to cloud services that developers can use to store data, manage users, send push notifications (i.e. a kind of pop-up for mobile phones), integrate with social media etc.
- Cross-platform tools: Developers that want to introduce their application on more than one platform will use these tools as they can help translate the programming code the different platforms use.
- Component marketplaces and app factories: These tools represent a category where applications are created by either buying ready-made components or by using code-free, visual design tools that basically allows a developer to drag-and-drop functions into his application.
- User/crash analytics: The former of these tools track user behaviour and interaction with the application. The latter will analyse performance, give crash reports, track bugs and distribute for beta testing of the application.
- Marketing services: The tools within this category will help developers promote their application, integrate ads in their own applications, and track how these promotion campaigns are performing. These tools can also help developers monetize their applications through ads.

Other tools that are rather self-explanatory are game development tools, beta testing tools, location platforms and geofencing, etc.

## 4.5. THE PARTICIPATING COMPANIES

Below is a table (table 3.) of the companies within the B2B tool provider industry that participated in this study. The table gives a quick overview of the companies' occupations, followed by a more thorough description of each participating company in sections 4.5.1. to 4.5.7.

| | |
|---|---|
| **Appcelerator** | The Appcelerator Platform contains of a complete set of integrated products that allow enterprises to create, deliver and analyze their complete mobile application portfolio. |
| **BugSense** | BugSense monitor their apps in the wild and make sure they are constantly stable and updated. BugSense created an app-monitoring solution that takes no more than two minutes to install, leaves a small footprint, and delivers huge value. |
| **iBuildApp** | iBuildApp's mobile content management platform provides a cost effective solution for companies to build and optimize their mobile presence for all smartphone devices. |
| **Nohau** | Provider of solutions for system development and for embedded systems. Are helping companies cut costs and improve quality when developing software. |
| **Transifex** | Transifex is a version-control system and repository for its clients' global content, such as strings, video subtitles, landing pages and marketing emails. This system let's the clients focus on handling translation quality and not have to be concerned about spreadsheets, emails with |

| | |
|---|---|
| | attachments, or FTP servers. |
| **AppFigures** | AppFigures offers a reporting platform for mobile app developers that brings together all of their app store sales, ad data, reviews, and hourly rank updates into one self-generated and informative solution. |
| **Anonymous Alpha** | An ad network company within mobile traffic monetization. They provide their clients with eCPMs (effective cost per thousand impressions) well above the industry average with a simple SDK implementation. |

Table 3. An overview of the participating companies


### 4.5.1. APPCELERATOR

Appcelerator describes themselves as satisfying three developer needs. First of all, some developers struggle with differing programming languages for different operating systems, also known as cross-platform. With Appcelerator, the developer can however write the application once and it will work on all operating systems, thus achieving maximum end user reach. The second need is related to the fact that developers want to track the progress of their applications and monitor things like number of installs, session lengths, general application adoption, etc. The applications created with Appcelerator will therefore have built-in analytics to assist the developer. The final need they address is called Backend as a Service (BaaS), i.e. data storage and general user management through things like push notifications.

### 4.5.2. BUGSENSE

Much as the name implies the company specializes in helping developers identify what is wrong with their applications. They argue that there will always be errors when it comes to software development; the question is how severe these errors are and what users are actually affected. Therefore, BugSense profile themselves more as quality monitors than error trackers. BugSense is compatible with the most popular operating systems, and as of today, several thousands of companies and developers use BugSense's tools.

### 4.5.3. IBUILDAPP

This company differs somewhat from the other tool providers in that they are not focusing on any one specific problem that a developer might encounter in the development process, but rather on the entire process of creating an application. iBuildApp offers a comprehensive solution for creating an application from scratch, which means that the line between developer and end-user is somewhat blurred as people with no technical know-how can create a fully functioning application. The idea is that the developer use iBuildApp's solution to design the application by using several stand-alone components called widgets. These widgets have different functions like music-players, photo galleries, mapping services, Facebook connection etc., and the developer can choose which functions he/she would like to add to the application. With several hundreds of thousands of app-builders, iBuildApp engages in a lot of support and service to make sure that the operation is running smoothly. One example of this is the local customization of widgets as some, like the mapping service, requires input from its immediate surroundings.

### 4.5.4. NOHAU

Nohau provides support for developers who work with software to do so with better quality and better efficiency. They provide different sets of tools, services, and even some training for software developers. Their customers' range from general IT-companies to more technically advances organizations like Eriksson, Nokia, SAAB, etc. They help developers deliver the right software, at the proper quality, at the right time.

### 4.5.5. TRANSIFEX

In the software industry, the best and usually underrated strategy for targeting a global market is to always keep in mind the localization process. Localization may seem as a trivial task but it is the complete opposite. Developers hate dealing with localization and need a platform to automate the process for them. The services of Transifex act as a middleware between developers and translators, also giving managers the opportunity to supervise the localization pipeline in an intuitive and easy way.

### 4.5.6. APPFIGURES

While app stores are great for end-users they do not provide developers   with good enough tools they can build a real business around. That is where AppFigures really excels as their sole focus is on developing a platform   consisting of a comprehensive set of tools developers can use and rely on to   improve their apps' performance in the app store. Technically speaking, AppFigures do all of the dirty and time-consuming work   developers should not be spending their time on, such as collecting sales data   from all major app stores and ad networks or aggregating and indexing reviews.   So, they are very easy to use as a feedback loop.

## 4.5.7. ANONYMOUS ALPHA

This company basically helps developers extrude money from their applications. When creating an application there might not always be clear ways of collecting money from people using it. By including things like banner ads in the applications, developers can however make money from the people advertising as traffic is directed towards them. This is where this company comes in as they connect advertisers with application developers. After the ad is integrated into the application both advertisers and publishers are provided with analytics tools to help them track the progress of the ad and application.

## 4.6. INTERVIEW RESULTS

In this section the results of the interviews made for the case study are presented. As mentioned before, seven companies from the B2B tool development industry were interviewed.

## 4.6.1 REVENUE MODEL

How do these companies actually make money, be it licenses for software, support or any other model? The most common answer was that the interviewees relied on license revenue. That is, they make money by selling software licenses, often on a subscription basis. Developers will download the specific tool they need for their application and use it as long as the subscription is valid, unless they extend the subscription. Other tool providers sell their product for a one-time license fee. According to Appcelerator, the period of time a tool is being used is related to the size of the developer. Small developers will not use tools as often/long period of time as an enterprise that develops several applications simultaneously.

The notion of tools being used longer by enterprises is in a way validated by BugSense, which reaps most revenues from these larger companies. The CEO from

Bugsense also mentioned that a year or two ago it would have been hard to justify a price increase by over 50%, but today developers are more educated on the development process and can understand that the higher price yields better solutions. It is therefore not uncommon for developers to request enterprise-level tools even though they cost much more and similar (but inferior) tools can be found for free.

When it comes to ad networks, the tool provider is often paid when a user in some way interacts with the advertisement. As an example, the respondent from the anonymous company, "Alpha", was paid at the time a user downloaded a specific application through their advertisement.

There are yet other revenue models where the tool provider uses a mix of different income sources. In this case, iBuildApp was relying on income from license subscriptions, advertising, support revenue (where they helped publishing applications on an app-store) and even from partners reselling their service. This company is also working with solutions for industry and technology verticals, i.e. where their products are being tailored to specific markets.

According to Transifex, the greater the plan a user is in, the more features the user can take advantage of. This includes a higher priority regarding support. The usual case is that users start with a lower plan and gradually move towards the bigger ones. Long term, healthy relationships always pay off.

However, in AppFigure's case, given the nature of their solution, they integrate pretty well right before starting development (research) and right after launch (tracking):

> *"Developing an app requires a certain investment and carries with it a certain risk, which can be minimized by targeting a good niche of the app store with a good product. Developers use our service to look up the ranks*

*and reviews of any app in any major store to get a better understanding of*
*where to position their app."*

*- Ariel Michaeli, CEO at AppFigures.*

Post-launch, developers use this service by AppFigures to gain visibility into the app's performance and to understand trends. Using a combination of private and public data, developers can then make more intelligent decisions about the future of the app without having to guess.

### 4.6.2. CUSTOMER BASE

The respondents had customers of all sizes – from top 10 players on the iOS and Android market to smaller independent developers making very simple applications. Some of the respondents described their customer's adoption process as employees further down the hierarchy basically playing around with the tool and later on promoting it to the managerial chain. Since many of these tool providers are offering free versions of their products, customers can try it out before going for the paid one.

### 4.6.3. CUSTOM MADE TOOLS

The general opinion among the tool vendors interviewed is that there is no real demand for custom made tools. The reason being that the tools they offer are adapted to such a wide user base that no customization is needed. They argue that the companies engaged in customization are mainly working with open source. One of the interviewed companies, Appcelerator, gives developers the tools, the SDKs, the idea, the testing solutions, the analytics, and then leave it up to the customers how they are going to use the API:s to create an app. The only customization that is done by Appcelerator is altering publically available products based on customer requests. BugSense incorporates a lot of customer feedback to improve their products, however most of the companies in their line of work try to avoid

customization because it is not a scalable business. BugSense wants to drive the customer to what they are offering and not the other way around. Most of the customized work they do for certain companies represents less than 10% of their income and the resulting products are often made available to the public. In this way, the programming that they do is not lost at the end to a specific company, but instead put in their product portfolio for everyone to enjoy.

Nohau confirms BugSense's view that most tool providers are focusing on standardized solutions because of cost restraints. Nohau offers fairly standardized products in the sense that they are fulfilling certain developer needs in each product segment. They argue that the companies engaged in customization are mainly working with open source.

*"There is much more demand for a platform that   already has all the necessary tools and that is evolving on its own. We believe in helping all developers and not just those with deep pockets."*

- *Ariel Michaeli, CEO at AppFigures.*


This quote by the CEO of AppFigures confirms the above statements by BugSense and Nohau.However, Transifex says that there are some customers, both small and large, that always need – or *think* they need – custom solutions.  In 90% of all such cases, they are unaware of an existing solution or workaround. Yet, some generalized versions of requests for custom solutions become part Transifex's roadmap as they can make sense for lots of other users.

Finally, the ad sector seems to see a need for customized tools. Most of their customers are game developers and for them there is not much need of a custom product, but for better analytics. They have however not been able to find the 'sweet spot' in terms of what large-scale non-game customers need.

## 4.6.4. CONSOLIDATION, ENTERPRISES AND LOCALIZATION

Appcelerator describes this factor as a need for a 'mobile strategy'. To have a mobile strategy, developers need to create many different applications and the people who will throw money at this are the large enterprises. So, for them to develop those applications they need to think in typical web-application and desktop terms: prototyping, designing, developing the application, testing the application, and tracking errors/analytics. For each of those phases there are a number of players who are working with the corresponding tasks (prototyping tools, developing tools, testing tools etc.). Companies within each of these segments are groups trying to envelop the other areas (e.g. cloud services trying to do analytics). Those who do not have the money to do this effectively are partnering and consolidating with other companies. Then there are companies like IBM who just buy every part to put together a comprehensive offering.

The majority of the respondents envision significant consolidation over the next two years. There will only be a few players left who collect the lion share of the profits.

> *"I believe all tool providers will be consolidated into an entity called*
> *"mobile application performance management. This would provide all the*
> *functions that today are rather spread out in the tool provider market.*
> *Hence, I do not think there will be no independent companies in the future.*
> *The features offered to developers will probably also change somewhat, but*
> *companies like Google Analytics will provide them all."*
>
> *- Panos Papadopoulos, CEO at BugSense.*

Meanwhile, Transifex and iBuildApp put focus on localization, saying that decision makers tend to think more and more about localization, as they see the value of it and want to be there first. The advances in the Internet and mobile world have made the addressing of a foreign market an extremely easy case. The factor that

made the difference in revenue and dominance is how one can maximize the gain those advances offer one. Localization is a major component of that factor.

However, the CEO of AppFigures, Ariel Michaeli, does actually believe that his company will offer the same solutions in a few years as they do today, but only as a starting point: *"As the app store develops so do the needs of our members, resulting in improvements to existing tools and also brand new tools"*.

### 4.6.5. TOOLS THAT ARE SUBJECT TO CONSOLIDATION

Consolidation within this business might be a fact in the future. Appcelerator said that unless tool-providing companies expand, all of them are at risk of being consolidated. The reason for this is that developer tools by default have very low valuations so they get a low percentage on the VC market. Some of the areas speculated to be consolidated first are design, because of its limited market and dominance from Adobe, and crash-analytics. Appcelerator's arguments are supported by BugSense, which thinks most tools will be consolidated into bigger players, and that many of these tools will be moving towards more established, preferably cloud solution companies. This is explained by the fact that data is not portable in today's companies, but a larger corporation such as Amazon would allow developers to more easily build their application functions on top of that data. Nohau describes the situation as a market which is still very innovation driven where the 'giants' are struggling with finding comprehensive solutions for developers. The focus is on large corporations (i.e. HP, IBM etc.). Smaller, niche companies are constantly looking for new markets and new developer needs to satisfy, but will eventually be enveloped by the larger corporations.
One of the respondents that works in ad networks, which is the company that preferred to be anonymous, "Alpha", ranked their own sector as the next subject to be consolidated. The market has not yet adapted to using a good cost per impression (CPI) tracking technique.

## 4.6.6. CUSTOMERS' SPENDING PATTERN ON PAID VS. FREE TOOLS

The number of customers spending pattern is extremely fluctuating because of the ever-changing industry. One of the biggest companies that participated in the interview, Appcelerator, has their SDK as open source, which means that anyone can download the SDK and create an app. The IDE (integrated device electronics) is free, which means that one can download it and actually develop apps using the SDK. The company's cloud-services also have high limits for free and let's the customers do 5 to 10 million API (Application Programming Interface) calls. The analytics service is free as well, but only up to a certain level. So basically all their offerings are free up to a certain user limit, and after that one becomes a paying customer.

The customers of Appcelerator can start and develop an app for free and never reach that limit of charge. The respondent says that they have a rather large user base that is using their free tools but several other developers prefer the paid ones since they offer more comprehensive solutions, which is highly valued. The anonymous respondent, "Alpha", was the first who did a commercial distribution of Linux and it was free for anyone to download and install Linux on their machine. But, if one is an enterprise that wants to set up one's file servers and data servers on Linux one is not going to buy the free version, instead it will be more suitable to buy the full version with all the "bells and whistles". To summarize it all up; there are a bunch of users using the free material offered and then there are a few users that are paying.

## 4.6.7. THE EFFECT OF LEAD TIME ON BUSINESS

According to BugSense there is no time to develop, just maintenance of the service. Everything costs and takes time, even if it is open source there has to be someone to monitor it, and this is a cost, which makes it complex. They invests a lot of time in this, they have old features that are difficult for customers to

maintain and schedule.  There is no consolidating in developer tools, one is commoditized; the possibility of open source solutions in the future means users will not need companies like BugSense.

> *"The important thing is as the hosting cost drops you can offer more for free for developers that are more price sensitive, when you go to big corporations they just want someone that is responsible for this task and takes care of the job, they pay you for the feature and maintenance. Big corporations do not really care if this is occurs internally or externally, but they prefer externally since it enables them to offer better cost."*

> *- Panos Papadopoulos, CEO at BugSense.*

Nohau, on the other hand, says:

> *"Yes, of course there is a demand for shorter lead times. Today the traditional mechanical engineering companies have perhaps half of its IP/its value in software. Much of what product uniqueness is in software today, and it is clear that there are huge investments and that half of these go to software, so if a company can save percentage on development times and lead times, it is then very much affordable for any organization."*

> *- Mikael Johnsson, CEO at Nohau.*

Appcelerator says that there is an important distinction to be made here, the value chain has the following players: the ones that want an app, the ones that are developing an app, and the ones who provide the tool to develop the app. The latter part is obviously third party tool vendors, Apple, Google, and Blackberry, etc. In some cases, the companies who provide the tools also do some kind of custom work, but usually they do not, or if they do, they do a little and then there

is a layer on top of that; which are development shops who are using tools, like Appcelerator, to develop apps for themselves or for the guys higher up the chain. The ones higher up the chain have two choices: they can develop apps in-house or they can outsource. Usually they have the money to spend, the first time they develop an app they almost always outsource because it is a new thing, and there is no point in investing internally so they find a partner. The partner either use whatever tools they want to use and develop the app and based on the success of this product then they decide if they are going to move on with developing in-house or continue to outsource.

On the question of how institutions that are handling sensitive information would relate to development tools, Appcelerator said that they would avoid them. They would try to develop in-house or try to find a partner who would comply with their requirements. The challenge is that places like banks usually have very high standards and meeting those requirements is a very throbbing process, both for tools companies and for developer partners, because of this there will be more in-house development. There are maybe three industries that have very high requirements in terms of compliance. One is health, the other is government and the last is the financial sector. Usually they come together with guidelines that have paragraph after paragraph.

According to AppFigures, the core of their platform is a sync engine that has been in development for several years and requires a lot of improvements and maintenance. This would be very hard for individual developers and even larger corporations to develop and maintain as an in-house tool.

### 4.6.8. AN INCREASING TOOL-VENDOR MARKET

The market is increasing. There are some sectors that may not exist, like development studios where there are codes added, before it was just the private market, now there are open source solutions. This market is evolving pretty fast, but

then there are other services like cloud services. In the past there was no cloud services available, since it is not a developer tool. However, today it is moving fast, i.e. analytics, where the problem is Google Analytics, which is killing everything and offering so much for free. Of course there is profit there and it is very difficult for new players to come in and play, but the market is growing, however the entries are decreasing. The majority of the respondents believe there are two major reasons for that increase. The first one is that nowadays it is relatively easy to build a tool that developers may need, so "everybody" tries that out. The second one is that lots of tools and the ideas behind them are overhyped and smaller companies believe that those tools are the way to go because they see larger ones using them. Hence, it is a combination of actual value and an upcoming bubble. Just like the App store, the tools market is increasing rapidly. As more companies turn to mobile, new needs   are introduced and new solutions are created. There is a whole new world arising in the app market in terms of what SEO (search engine optimizer) became for the web. One of the respondents currently has search engines (Play Store and App Store) and the task now is how to get to the top of the "best cool free games" query. Besides, in terms of Ad Tech, there is a lot to be developed.

However, Appcelerator says it is south bound, since developers are not used to/do not like to pay. So one can either cater the small-time developers, but need to focus on enterprises that have the most money, however they do not need developer tools; they need more things, they need the whole shebang, the whole life cycle. The future would probably mean offering tools to developers as a supportive function and mainly focusing on enterprises.

> *"I really can not come up with any significant tools company that makes money right now. Even Adobe who has a bunch of developer tools, they either open-source them, kill them, or drop the price so low it's ridiculous."*
>
> *- Gabriel Tavridis, Director of Product Management at Appcelerator.*

### 4.6.9. LOCUS OF REVENUE BETWEEN TOOL DEVELOPERS AND TOOL VENDORS

Many app developers can develop an app for free using text pad and x-code. The only thing needed is a subscription with an app-store. According to Appcelerator tools are pretty low in the value/revenue chain and this is why tools vendors (unless they expand to other categories) do not have a chance. Most revenue is being captured in mobile application management and mobile device management is a category that is profitable. These are companies who are responsible for the secure distribution of applications, so when an enterprise is developing an app they can post it on an enterprise app store, it is not publically available, the app is secured, they can decide who is going to and who is not going to use the app; people have to log into a specific account to get access to the app. This is primarily for apps within an enterprise. Analytics is another area that is capturing a lot of the value just because there is significant need for analytics from the business side of the customer. The business side also usually has most of the money that is where the company feels they can spend most to make the right business decisions.

Developers capture less revenue now when they use more tools to create their app. There is nothing left for them when the tool providers catch all the profits. If the customer is a small developer, he/she tries to get all the services for free. If the customer does not make enough money to pay, he/she will search for services that are free, like the ones big tool developers offers. An example was brought up during the interviews where BugSense said they had customers that thought paying $19 dollars per month was too expensive, so they got it from big tool develop companies that offer these tools for free. BugSense said that they would therefore lose customers, but they have others that have bigger needs or even more specific need that requires maintenance. It is the maintenance service customers are paying for:

*"The early adapters will move on to the free tools, but then there is the enterprise customers, that are ladders, that came in late, they are going to need the best. A company has much different profitability care there, because these customers have much more money, you can even charge them for support."*

*- Panos Papadopoulos, CEO at BugSense.*

## 4.6.10. DEMAND AND OFFERINGS

There are always new tools that are coming and they are working to find new technologies and develop the market for it. Appcelerator has already started to go towards enterprise. What they offer now is less of a stand-alone developer tool and more of a complete platform for delivering mobile apps, for example testing, analytics, supporting, cloud etc.

iBuildApp said that the demand is in local markets and the marketplace. They do not have a good footprint in Sweden and other places, so they need people to help them with that. They have the technology, but they need partners in local markets to help them tune their offerings to local habits and what not. They need local partners and industry verticals. Right now they are testing the market and raising capital and partnering with big companies.

## 4.6.11. FUTURE

The majority of the respondents see trends in B2B apps and services, in-app purchases tied up to the company's ERP and purchasing systems. There are new technologies that are arriving all the time, so it is hard to say what the customers and businesses embrace. There are great technologies that never rise and reach a critical mass for some reason, which never get established on the market. AppFigures says that revenues will ultimately follow any products that actually add value. At this point there are many untapped areas, even in the field of analytics,

which will see great returns for investments currently made. Many of the respondents can relate the growth of the app market to that of ecommerce or Internet advertising. Like apps, larger companies were slow to react to new technologies and the tools lacked as well. As companies started sinking their teeth into the revolution so did service providers to the point where the tool providing companies have at least a few variants to every basic tool.

However there are others that do not completely agree. The CEO at BugSense says that the trends in revenues will not change:

> *"It is really simple economics, i.e. if you are in Stockholm, and let's say there is a neighbourhood that is not that great, but hipsters like it, they go there to bars that are very new and modern, and even if it is an odd part of town people go there. This will later make more people go there and spend more money and it will probably get more expensive. The first ones, the hipsters will eventually leave, but there is more people left now that keep spending money. This translates into the early adapters that went there before it got expensive (and popular) but do not like it anymore since they want something cheaper. These early adapters leave, but you will still have this mass left that came after the early adapters, the ladders."*

> *-Panos Papadopoulos, CEO at BugSense*

It is the same with tools. In the beginning users want the tool, but after they have been using it for a while they say: *"Yes, I like it but I think I can make it on my own"*, so they will go and create a better solution for themselves. Nonetheless their early adaptions have brought the big players that want something that is working and someone that will always be there for support, to fix thing when they go wrong.

**4.6.12. THE FUTURE OF THE MOBILE SDK MARKET**

Mobile Ad Tech is a predicted trend that will be dominated as Web Ad Tech has been by Google:

*"I expect to see less and less needs for SDKs as they start being bundled into Android itself by Google or in the form of APIs instead of full fledged SDKs".*

*- Anonymous respondent at "Alpha".*

BugSense said they would try to target Windows as well. They want to reach 10%, because Windows is a bit more incorporated with users that are used to spending more money unlike Android. BugSense wants to establish there and they want to be the only ones present. Most of the money will come from enterprise entities. After targeting Windows they want to go on to Asia:
*"We are launching in Japan next month. There are still opportunities in this market, with laptops becoming tablets and so on".* BugSense has seen rapid growth over the last year. By the summer the company is expected to have increased with 200% in revenue since last year.

Working in services and consulting is a clear trend among the respondents. This is confirmed by Nohau, which says that tools will be sold in a different way, e.g. all types of licensing solutions. A traditional distributor of software will surely be in trouble if the distributor is not able to provide expertise and to work more closely with the client to implement these new IT processes.

## 5. ANALYSIS

## 5.1. ECOSYSTEMS – THEN AND NOW

The framework and model in the theory section describe how a modern ecosystem can be designed. This framework matches the mobile industry of today rather well but would probably not have done so a couple of years ago, before the emergence of smartphones and applications. Operators were responsible for distribution, while OEMs were responsible for creating handsets and the innovation around handset. Platform vendors have replaced both of these control points as the main control point for service distribution. It is however worth noting that remnants of the old mobile ecosystem are still running on our phones. The basic functions like calling and texting are still essential to mobile usage, and represent the old mobile ecosystem, which in a way is superimposed by the new one. The new ecosystem is responsible for the vast majority of innovation. The new industry consists of apps, whereas the old one consists of classic mobile industry.

Looking at the findings in the empirical section, it is possible to make some immediate conclusions about the evolution of ecosystems in the mobile sector. In the early years of mobile, companies like Nokia ran on proprietary systems and the process of finding outside developers and letting them develop software was significantly more complex. This was still an ecosystem but a closed one. If we compare that to the ecosystem of Apple we see some similarities as well as some differences. Much like the old Nokia, Apple surrounds its platform with barriers in the form of tough demands on its developers. Unlike Nokia however they more or less allow everyone to develop software for them through various user-friendly SDKs. To illustrate this more graphically, an impenetrable bubble can be visualized around the ecosystem of Nokia while Apple have strictly controlled gateways to get inside the ecosystem.

## 5.2. TWO-SIDED MARKETS

Well inside the bubble of the ecosystem, developers need some unifying function that will grant them access to end-users, as well as let them enjoy the network effects of other developers attracting people to the platform. This is something that the likes of Apple and Google solved with the app stores where developers and end-users can reach each other. Just as Holzer and Ondrus (2010) describe in their model over the mobile industry, this is a clear example of a two-sided market. If it is possible for technical ecosystems to arrange their platforms around two-sided markets like Apple and Google, it might prove to be a profitable business model, as the general public will supply much of the creativity and value creation.

The challenges with two-sided markets described by Eisenmann et al. (2006), can be applied to the mobile industry. When it comes to pricing the platform, the usual pattern is that developers are subsidized by free SDKs for the respective platform. Users on the other hand, can be seen as the money side, as they are often charged for the applications or at least for the hardware (i.e. the phone). Looking at winner-takes-all dynamics, there already seems to be a few established and separated platforms. Managers have obviously determined that their market is destined to be served by more than one platform and they are not sharing their platforms in any observable way (Ibid, 2006). Finally, the threat of envelopment seems to be more of a standoff between the dominant players (Apple and Google). None of them really envelop each other but are actively enveloping other areas like cameras and computers etc.

### 5.2.1. MANAGING USERS AND DEVELOPERS

The empirical findings do however point to some obstacles besides joining companies and customers over a platform: The platform provider needs to attain critical mass to allow the two-sided market to become self-sustaining. Further,

the platform needs to be user friendly in order for developers and users to be attracted to it. Looking at iOS and Android, the two giants among mobile platforms, they obviously have attained critical mass on both sides of the market. They are also offering their own SDKs for developing applications for each platform. However, what is interesting here is how they differ in their approach to application developers. Apple has rather strict guidelines over how the applications (products) should perform while Google is looser in its requirements. Logically, and in line with our findings, this has resulted in a multitude of applications with varying quality on Android and fewer, but with higher quality, applications on the iOS platform. Both approaches have their appeal. Platforms in ecosystems that rely on two-sided markets and that want to profile themselves as a high quality brand, would probably do better imposing restrictions on the material that is offered to the platform, much like Apple. The model that Google applies does however attract the masses, as developers are not intimidated by harsh regulations. A more relaxed developer/supplier climate could therefore inspire more creative solutions in these kinds of ecosystems.

## 5.3. VALUE CHAIN DECISIONS - CREATING CONTENT

Regardless of how many requirements platform providers impose on companies; one of the key objectives is to make sure that there is a steady supply of products keeping the two-sided market running. In this case, the products are applications and the platform providers (i.e. Apple and Google) need to make sure developers have all the help they can get to develop these applications. As already mentioned, the platforms offer their own SDKs for developers to make the basic parts of the application. This is a necessity as it attracts developers by reducing the on-boarding friction. Potential developers will in that way see the low entry costs as enough reason to start using the platform. An application is however often quite complex and for them to be popular and work properly, other parts need to be added. The answer comes in the form of third party tool providers that supply SDKs and services that will help application developers create that extra

edge. Supportive functions like tool providers can therefore be seen as something platform providers need to nurture in order for the ecosystem to prosper.

Looking at the different characteristics of tool providers, we see that they basically solve every need a developer might have throughout the development process. Just the tool providers interviewed in this research, collectively solve many of the needs a developer might have (see Appendix 7.1.). Given the fact that you can get help with more or less everything needed to create an application, the general application developer is probably not always as easily defined as a couple of years ago. As tool providers can solve most technical issues through their SDKs and services, one of the few parts left for developers to help end customers with, is design. Many developers can therefore be assumed to be mere design bureaus outsourcing everything but the creative part of application development.

## 5.4. VALUE CHAIN DESIGN

A more modular pattern as described in the theoretical framework model now starts to arise. Consumers are interacting with developers who in turn are partially or totally dependent on supportive functions. The theoretical framework adapted to the mobile industry is presented below (figure 10) and displays the tool providers as modules, perfecting the value chain for the companies making the application. Looking back to Karvonen and Warsta's (2004) model over technical value chains, everything except content packaging can be assumed to be put on tool providers. The ecosystem is in this case not only comprised of a two-sided market with developers and customers, but another layer with the market for modules (here tool providers), operates as a supporting function.

Figure 10. Technological ecosystem framework: B2B tool developers
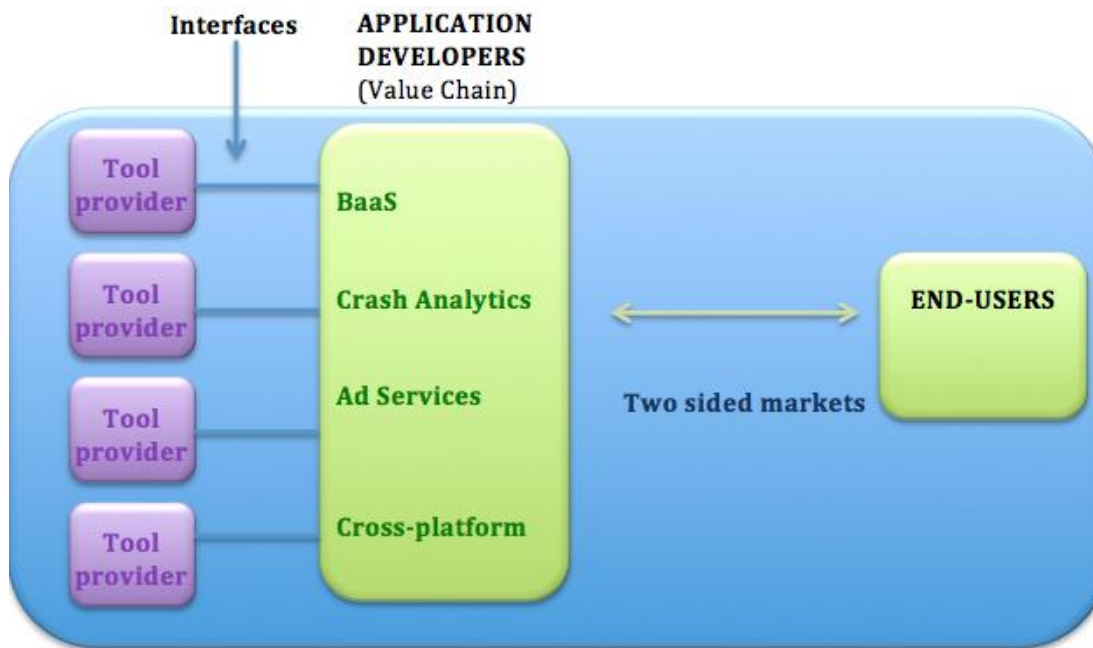


The interfaces in the figure represent the connections between developers and the tool providing company. As described in the theory section, Christensen et al. (2001) name three conditions that need to be met in order for developers to become modular. The specificity problem is addressed, as developers understand what they are not able to make themselves and choose to outsource it. The verifiability condition is met as the end product (application) can be tested to see if the tool in question meets the demands. Finally, the predictability is ensured as many of the SDKs allow the developers to adapt the tool to their existing software.Closing these interfaces is what tool vendors are doing through acquisition; they are buying these tools, solving the problems and selling them to extract profits.

Interview findings point toward a growing, yet volatile, market for tool providers. Companies in this part of the ecosystem retain their application developing customers by engaging them in subscriptions for licenses to use the software or service. With applications needing continuous support, this model ensures long commitments to the providing company. Many companies within the tools sector

(including interviewees) do however offer a set of free tools for developers only using the services limitedly. The bulk of the money instead comes from larger enterprises developing applications. This means that most of this market for modular functions is financed by larger players. Smaller companies can therefore take a "free ride" and make complete products (applications) paying virtually nothing at all.

One tool provider sector that stands out is however marketing services that make money based on how many people are exposed to the advertisement. Offering this function for free is obviously not as easy as the ad-space is already crowded as it is. Furthermore, this sector is rather interesting as more people use their smartphone for surfing the Internet.Internet marketers have a hard time integrating commercial pieces on screens that are relatively small compared to computers.

With a focus on larger companies as the main source of income, a plausible implication would be that tool providers start tailoring their services to better serve larger customers' needs. The results do however show that most tools are universal in their design and do not require customization. The custom work that is being done accounts for only a small portion of their income as it is not a scalable business and cannot be offered to the masses. In this respect, even though smaller companies do not account for the largest revenues, they are still important as they help accelerate the network effects and attract more paying developers to the company. Also, as one interviewee explained, smaller independent developers that try out their tools for free might end up recommending the tool to a superior who starts using it on an enterprise level. One of the few fields customization might be needed is in industries handling sensitive information. Tool providers working with banks, hospitals, juridical institutions etc. can be assumed to have higher demands of customization in their solutions to protect sensitive data.

### 5.4.1. DISRUPTIVE TECHNOLOGIES

The ecosystem of mobile is becoming increasingly important as more and more people use their smartphone for things that used to be done on computers. Banking, shopping, surfing, gaming, online socializing, etc. are all examples of what used to be confined to computers. The computers of today are capable of much more than word processing and surfing. Areas where high computing power is utilized, are perhaps advanced design and gaming. Once mobile devices start to catch up in those areas, the regular computer industry will have a harder time finding customers. This is in line with Christensen's (2001) theory on disruptive technologies and how they can shift the power of companies by satisfying overserved customers. Here, the computer industry is massively overshooting what consumers can absorb in terms of performance and the mobile industry in a way capturing those overserved customers.

### 5.4.2. CLOCKSPEED PROPERTIES

The mobile industry known today is relatively young but because of its technical properties it has already had time to evolve. Judging by the empirical findings in Appendix 7.5., many of the tool providing companies have only been in business a couple of years and was not present at the start of app stores. The developers of that time must therefore have had to develop many of the functions offered by tool providers today, by themselves. This is corroborated by interview results, which also add that developers actually used developer tools from the beginning but those were the SDKs provided by Apple, Google, and Microsoft etc. and therefore provided for free. Making every function in-house tells of a vertical value chain where all revenues, apart from a percentage to the platform providers, stay at the developer. As tool providers started to flood the market and dropping prices on their products, developers became increasingly modular and horizontal in their value chain design.

So far, mobile is following Fine's (1998) model over clockspeed industries as activities have become modular for developers. The next logical step according to the model is a move back towards vertical structures. The findings in this research indeed identify a move toward vertical supply chains as the tool providing market is increasingly being consolidated. What is interesting is that the consolidation is not occurring on the developer side but on the tool provider side, which stands in contrast to what Fine's (1998) model says. Eventually the dynamics of Fine's theory however say that these new and consolidated tool providers will grow to and integrate vertically. This means that as tool providers are consolidating and eventually will control a comprehensive toolkit with all functions desirable to developers, they will start developing applications themselves.

Besides the possibility of large tool providers starting to integrate vertically, there is another interesting implication of consolidating every tool into one big powerhouse. As many tools today are free up until a certain level of usage, a comprehensive SDK from a consolidated tool provider would presumably also be offered for free up until a certain level. If a large company like Google whose core business is advertising, would offer this comprehensive toolkit, they would probably see this as a perfect place to integrate commercial messages. Likewise, other players who are acquiring tools can use this free version of a SDK to combine with their core business and in that way attract more customers to that business.

So what started the move towards modularization and later back towards integration? Christensen et al.'s (2001) theory on disruptive technologies does not really work as a good explanation as it states that the developer supply chain fragmented because of products being too good for consumers and in that way let new players in on the market. What seems more plausible here is the emergence of a completely new market. Tool providing companies saw a growing demand from developers who could not produce all functions in-house, and acted on it.

This lack of know-how in certain areas coupled with a desire from developers to launch applications faster, are two strong arguments for the rise of the tool provider market. What is now pushing these providers together through consolidation does on the other hand correspond rather well to theory. Just like Fine (1998) describes, this modular industry is characterized by fierce, commodity-like competition where payers are starting to drive out or acquire each other.

Apart from enterprises, the only other source for value is marketing services since developers are willing to pay to overcome the discovery bottleneck of their application. This means anything from ad networks to matchmaking services. This might explain why some of the answers from the company involved in ad-networks were conflicting with the rest of the respondents.

After evaluating the empirical material, it is clear that there will be very little of these tool vendors left at the end of the day, because app developers are not paying money nor are they eager to start paying. Where the app developers are not able or willing to pay for tools, the tool vendors will be exiting, consolidating, or acquiring each other. There are also big venture capitalists that are investing money in bigger tool companies like Appcelerator, which is dropping its prices and using open sources to allure developers, hence they are creating a president for other tool vendors to not charge, which is creating behaviour patterns in these markets that are reducing everyone's ability to make money.

## 6. CONCLUSION

The mobile ecosystems of today revolve around the smartphone and the availability of applications. The mobile application industry has grown significantly the past few years and is today employing several thousands of people working in a multitude of sectors and countries. In order to form an effective platform, much focus is put on the actual creation of applications but this is only a part of the process. To launch a successful application many developers rely on various tools that provide them with features crucial to making an application popular.

### 6.1. RESEARCH RESULTS

Our main objective with this thesis has been to examine the mobile ecosystem from a wider macro-scale all the way down to the micro factors that help support the most basic functions within this ecosystem. Our theoretical model (figure 8) has visually illustrated the relationships between the supporting literature streams while the theoretical framework (figure 9) has helped us categorize the different areas in these mobile ecosystems. The model and theoretical framework developed for this research gives some explanations and predictions about mobile ecosystems, and maybe even ecosystems in general. Much focus has been on the most dynamic part of this ecosystem – the modular market. This because it has proven to be an incredibly important contributor to the content creation. In mobile application development, developers used to apply more of a vertical value chain and more or less create most functions of the application in-house. This is now starting to move the other way.

The modular market's importance to the platforms is evident as they support many of the key functions in creating value for end users. With an increased reliance on these supportive functions, more and more funds are moving further down the "funnel" of the ecosystems. Since most platforms in mobile are not making any money, this means that developers catch most of the revenue that is collected from

82

end users. Developers, in turn, are spending their income on tools to make applications. Logically, this means that money is migrating from the larger platform providers like Apple and Google, to tool providing companies further downstream.

Given that some tool providers are offering many functions for free, the notion of all revenue trickling down to tool providers is perhaps a bit brash. It should be added that the lion share of revenues are coming from enterprise developers and not smaller independent ones. Free tools can also work as a "try before you buy" offer where larger companies can get a feel for the product and know how it works before integrating it in their system.

One of the big trends in the modular part of the mobile ecosystem is consolidation. The majority of interviewees tell of consolidation going in several directions. Eventually, a few tool providers will control most of this market by offering a comprehensive SDK for developers. If the model that is applied today is to be trusted, this toolkit will be free up until a certain point of usage. Larger enterprise developers will therefore be the ones financing the future application development tools.

## 6.2. ACADEMIC CONTRIBUTION

The theoretical model and framework presented in this study can be used ex-ante to evaluate and identify ecosystems that might benefit from a strong complementors' market. They can also be used ex-post to explain how an ecosystem has evolved over time. Managers presiding over other kinds of ecosystems could in that way benefit from using the model and framework as inspirational source material when making business decisions. Judging from our findings in the mobile industry, one such decision worth making is around complementors as they represent an incredibly important part in mobile ecosystems. It should however not be forgotten that our findings also pointed towards revenues shifting towards these complementors and their suppliers. Manager considering involving

complementorsshould therefore keep in mind that their platform may be affected as complementors gain more power.

The theory also gave some insights on how mobile ecosystems might evolve, which is partially backed up by the empirical results. What is happening in the mobile industry might in that way help predict the future of other industries, like that of mobile.

Apart from a business context, the model and framework can also be used for academic purposes to complement theory on ecosystems and the processes occurring within them. As previously mentioned, our analysis is very much geared towards the mobile industry but does however provide some insights to ecosystems in general. The theoretical material can also be used as an example of how different streams of theory are interconnected and relate to each other.

## 6.3. CRITIQUE

The mobile industry serves as a good analogue to other industries working with technology as it is characterized as a rapidly evolving sector. What this research has found is mostly in line with what theory says about ecosystems and how its constituents work together. Still, the findings are based on a case research of the mobile industry, which may not be applicable to all ecosystems. An ecosystem does not necessarily have to be made up of the parts presented in the theoretical model. As an example, the mobile industry is heavily dependant on outside complementors, which may not be the case for other ecosystems. The framework and model also describe the industry in a rather layered structure with ecosystems at the top and complementors (tools) at the bottom. Many industries can have complementors from other ecosystems.

# 7. REFERENCES

Alvesson, M. and Sköldberg, K. *Tolkningoch reflection: vetenskapsfilosofiochkvalitativmetod.*Second Edition,Studentlitteratur, Lund, 2008.

Apple Press Info, January 7th 2013. *App Store Tops 40 Billion Downloads with Almost Half in 2012.* Apple.com.Retrieved: 2013-04-10:<http://www.apple.com/pr/library/2013/01/07App-Store-Tops-40-Billion-Downloads-with-Almost-Half-in-2012.html>

Apple, iOS Developer Program, 2013. Retrieved: 2013-04-28:<https://developer.apple.com/programs/ios/distribute.html>

Arbnor, I. and Bjerke, B. *Methodology for Creating Business Knowledge.*Second edition, SAGE Publications,USA, 1997, p. 454.

Barnes, S.J. *The Mobile Commerce Value Chain: Analysis and Future Developments.* International Journal of Information Management, Vol. 22, Issue 2, April 2002, p. 91-108.

Basole, R.C. *Visualization of Interfirm Relations in a Converging Mobile Ecosystem.* Journal of Information Technology Advance Online Publication, 24 February 2009.

Bryman, A. and Bell, E.*Företagsekonomiskaforskningsmetoder*. Liber, 2013.

Bryman, A. and Bell, E.*Business Research Methods.*Oxford University Press, 2007.

Christensen, C. M, Raynor, M., and Verlinden, M. "*Skate to Where the Money Will Be".* Harvard Business Review, November 2001, p. 72-81

Crowther, D. and Lancaster, D., 2009. *Research Methods: A concise introduction to research in management and business consultancy.*Second edition, Butterworth-Heinemann, 2009.

Eisenmann, T., Parker, G., and Van Alstyne, M.*Strategies for Two-sided Markets.*Harvard Business Review, 2006. Vol. 84, nr 10, p. 92-101.

Fine, C. H., 1998.*Clockspeed: Winning Industry Control in the Age of Temporary Advantage.* Sloan School of Management, M.I.T.

Gartner, February 13, 2013, *"Gartner Says Worldwide Mobile Phone Sales Declined 1.7 Percent in 2012".* Retrieved: 2013-02-26: <http://www.gartner.com/newsroom/id/2335616>

Gawer, A. and Cusumano, M. A., 2002.*Platform Leadership: How Intel, Microsoft and Cisco Drive Industry Innovation.* Harvard Business School Press, 2002.

Goldberg, L., 2013. *Shifting Up to 15% of TV Ad Spend to Online Builds More Effective Reach at a Lower Cost, According to New Research from IAB.* IAB.net, February 25th, 2013. Retrieved: 2013-05-13: <http://www.iab.net/about_the_iab/recent_press_releases/press_release_archiv e/press_release/pr-022513_dvresearch>

Hagiu, A. and Wright, J., 2011. *Multi-Sided Platforms.*Harvard WorkingPaper 12-024. October 12th, 2011.

Holzer, A., and Ondrus, J., 2011.*Mobile Application Market: A Developer's Perspective.* Telematics and informatics, vol. 28, no. 1, p. 22-31, February, 2011.

Iansiti, M., and Levien, P., 2004.*The Keystone Advantage: What the New Dynamics

*of business Ecosystems Mean for Strategy, Innovation, and Sustainability.* Harvard Business Review Press, August 1st, 2004.

International Telecommunication Union (ITU), 2011. Mobile App Downloads to Approach 48 Billion in 2015. June 10th. Retrieved: 2013-02-26: <http://www.itu.int/ITU-D/ict/newslog/Mobile+App+Downloads+To+Approach+48+Billion+In+2015.aspx]>

Iyer, B., Lee, C., and Venkatraman, N.N., 2006.*Managing in a "Small World Ecosystem".*Lessons from the Software Sector.California Management Review, 2006, p. 48(3), 28-47.

Karvonen, J., and Warsta, J., 2004.*Mobile Multimedia Services Development: Value Chain Perspective*. Published in Proceedings of the thrid International Conference on Mobile and Ubiquitous Multimedia, 2004.

Mackie, A., 2013.*Google vs. Apple App Development Process.Astekblog*, April 2nd, 2013.Retrieved: 2013-05-11: <http://www.astekblog.com/the-web/google-apple-app-development-process/>

Moore, J.F., 1993.*Predators and Prey: A New Ecology of Competition*. Harvard Business Review, 1993, [0017-8012], vol.: 71, 75-83.

Moore, J.F., 1996.*The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems.*West Sussex, Harper Collins.

Moore, J.F., 1998. *The Rise of a New Corporate Form*. Washington Quarterly. Vol 21 (1), p. 167-181.

Moore, J.F., 2006. *Business Ecosystems and the View from the Firm.* The Annual

Bulletin 52, p. 31-75.

Needle, D., 2012. *Report: App Economy drives almost half a million jobs in the U.S.*Tabtimes, February 8th, 2012. Retrieved: 2013-03-04: <http://tabtimes.com/news/ittech-stats-research/2012/02/08/report-app-economy-drives-almost-half-million-jobs-us>

O'Donoghue, T., Punch K., 2003. *Qualitative Educational Research in Action: Doing and Reflecting.*Routledge, p.78.

Rochet, J.C., and Tirole, J., 2006.*Two-sided Markets: a progress Report*. The RAND Journal of Economics, 37: 645-667.

Rogers, E. M., 1962. *Diffusion of Innovations*. New York: Free Press

Sanou, B., 2013.*6.8 Billion Mobile-Cellular Subscriptions*. ITU Telecommunication Development Bureau, February 2013. Retrieved: 2013-04-17: [http://www.itu.int/ITU-D/ict/facts/material/ICTFactsFigures2013.pdf]

Shapiro, C., and Varian, H.R., 1999. *Information Rules: a Strategic Guide to the Network Economy.*Harvard Business Review.

The Nielsen Company, 2012a.*Global Internet Ad Spend Sees Double-digit growth, outpaces other media*.2012-10-07. Retrieved: 2013-05-13: <http://www.nielsen.com/us/en/newswire/2012/global-internet-ad-spend-sees-double-digit-growth-outpaces-other-media.html>

The Nielsen Company, 2012b.*Global AdView Pulse: Your Connection to Global Advertising Trends*. Quarter 3, 2012.

The Nielsen Company, 2013. *The Mobile Consumer: A Global Snapshot*. February

2013

Vakulenko, M., Schuermans, S., Constantinou, A., Kapetanakis, M., 2011. *Mobile Platforms: Clash of the Ecosystems.*VisionMobile, November 2011.

VisionMobile, January 2013a.*Developer Tools: Foundations of the App Economy*.

VisionMobile, 2013b.*Developer Economics – Tool Atlas.*Retrieved: 2013-03-25: <http://build.developereconomics.com/tool-atlas/>

Zhu, F, and Iansiti, M., 2012.*Entry into Platform-Based Markets.*Strategic Management Journal.33, 1, p. 88-106.

## 8. APPENDIX

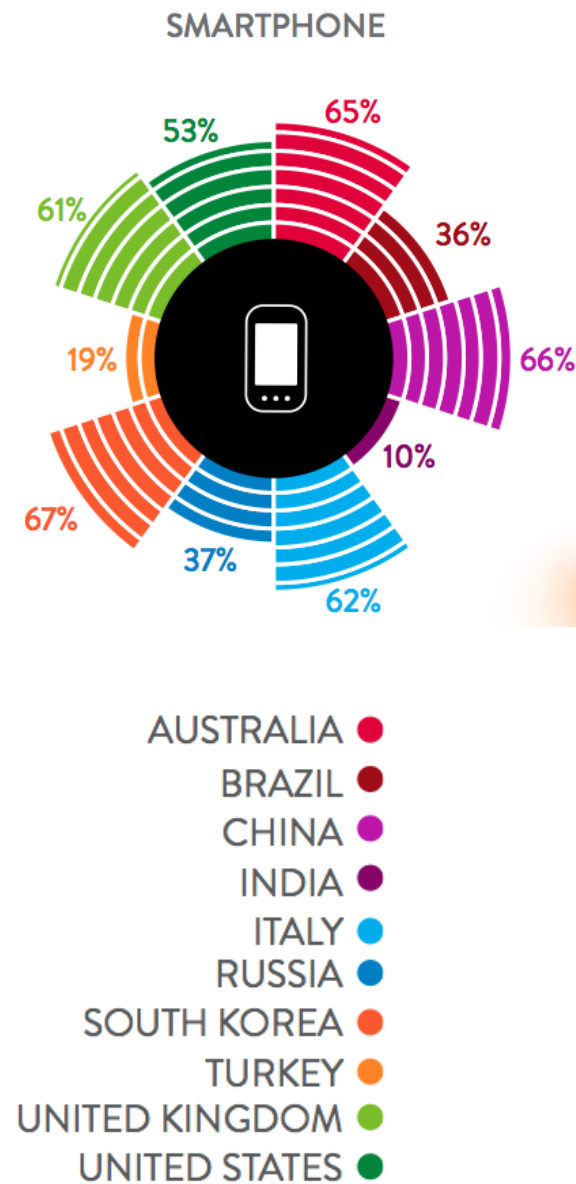## 8.1. APPENDIX 1

### 8.1.1. INTERVIEW QUESTIONS

- *What is your revenue model? How do you make money?*

- *What type and size of developer are most often buying/downloading your products?*

- *Is there a demand for custom made tools, maybe from some of your larger customers? If so, do you see this as a profitable service/venture?*

- *How would you say your sector is evolving? Do you think the solutions you offer today willbe the same in a few years time?*

- *What tools are subject to consolidation and what areas might require completely new tools?*

- *What is the spending pattern of your customers on paid vs. free tools?*

- *Out of the tools customers try out, approximately how many (in %) do they end up using again? Is there a common characteristic among the tools they use repeatedly?*

- *Do you think demands for shorter lead times from customers sometimes force developers to buy your products? If not, what is the most common reason your products are being downloaded?*

- *From your experience, where would you say that the tools-vendor market for developers is now? Increasing, constant or declining? Why do you think that is?*

- *Between developers and tool-vendors, who would you say have the highest revenues as of today?*

- *Do you see any clear trends in where revenues are headed in the future?*

- *Where do you see yourself and the mobile SDK market in the future?*

- *What is the demand out of your tool? Has it gotten bigger over the years and how will it evolve?*

## 8.2. APPENDIX 2

### 8.2.1. GLOBAL USAGE OF THE SMARTPHONE

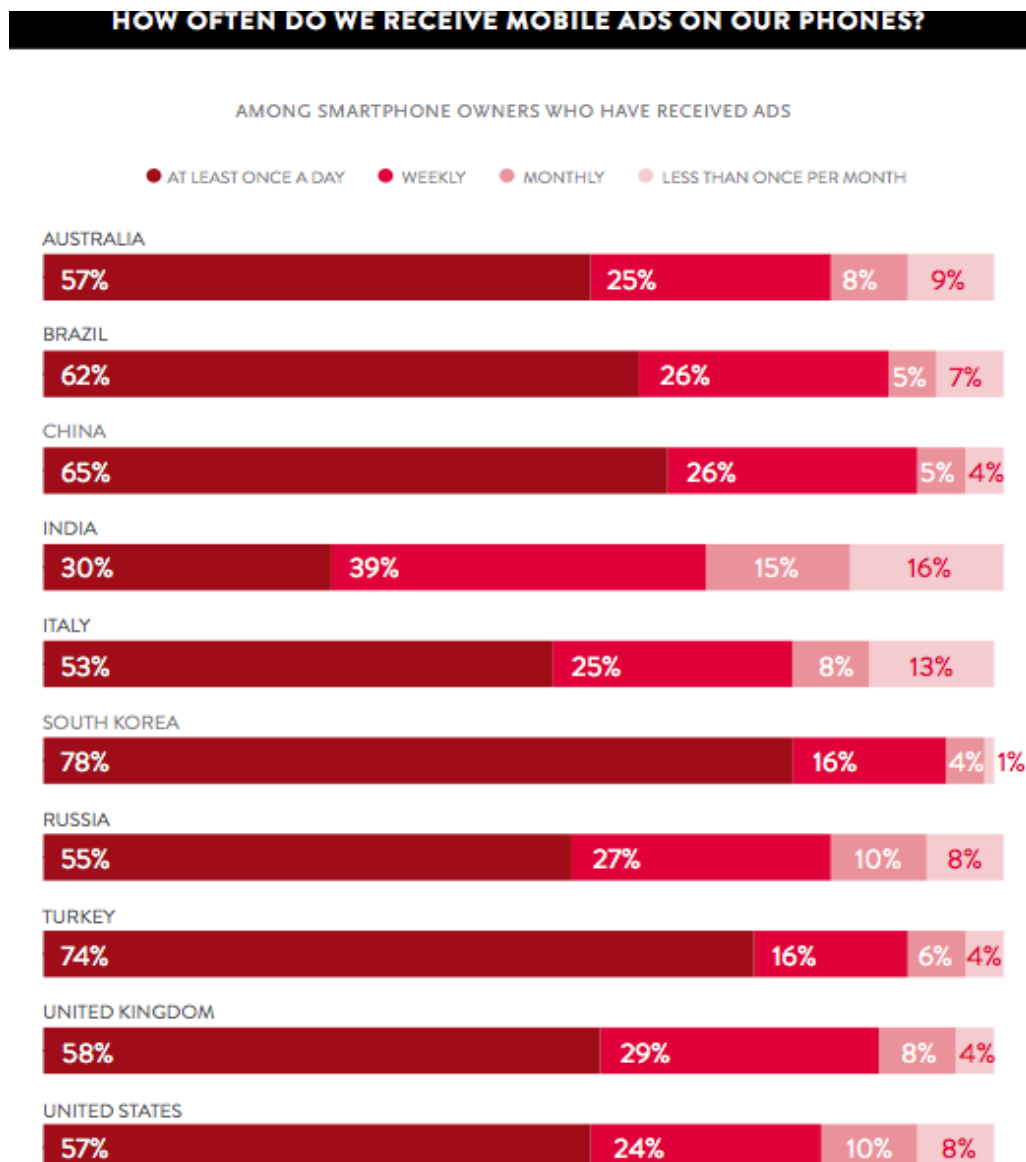Nielsen global smartphone insights, first half of 2012; Nielsen Mobile Insights 2012



*The Mobile Consumer: A Global Snapshot*. February 2013; p. 9. (Nielsen Company)

## 8.3. APPENDIX 3

## 8.3.1. MOBILE ADS

Nielsen global smartphone insights, first half of 2012; Nielsen Mobile Insights 2012



*The Mobile Consumer: A Global Snapshot.* February 2013; p. 33. (Nielsen Company)

**APPENDIX 8.4.**

**8.4.1. LIST OF B2B TOOL PROVIDERS**

Below is a list of companies within the tool provider industry. The list is no way near exhaustive as these companies only represent a small selection of the total industry. Nevertheless, the table will support the authors' arguments through statistical conclusions.

| Company | Founded | | Company | Founded |
|---|---|---|---|---|
| | | | | |
| 5app | 2011 | | Layar | 2009 |
| Appcelerator | 2007 | | Mobile nation | 2010 |
| Applicasa | 2011 | | Mobile roadie | 2009 |
| Appsbar | 2011 | | Mobtest | 2011 |
| Appsbuilder | 2010 | | Mockingbird | 2009 |
| Appsgeyser | 2011 | | Mosync | 2004 |
| Appypie | 2012 | | Nativex | 2000 |
| Axure | 2002 | | Onswipe | 2010 |
| Balsamiq | 2008 | | Parse | 2011 |
| Bugsense | 2011 | | Phonegap | 2012 |
| Capriza | 2011 | | Placecast | 2005 |
| Cloudmine | 2011 | | Pressly | 2011 |
| Corona labs | 2008 | | Red foundry | 2010 |
| Crashlytics | 2011 | | Sencha | 2008 |
| Crittercism | 2010 | | Shoutem | 2011 |
| Didmo | 2006 (2009) | | Tapcrowd | 2010 |
| Feedhenry | 2010 | | Telerik | 2002 |

| | | | | |
|---|---|---|---|---|
| Fluidui | 2010 | | Testbirds | 2011 |
| Gamesalad | 2007 | | Testflight | 2010 |
| Geoloqal | 2012 | | Twipe | 2011 |
| Geoloqi | 2010 | | Ux+ | 2009 |
| Ibuildapp | 2010 | | Webcrumbz | 2010 |
| Innaworks | 2002 | | Wope | 2006 |
| Iplotz | 2009 | | | |