Smartphones in the U.S.: Market Analysis

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Business Strategy for Lawyers
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Smartphones in the U.S.: Market Report

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I. Executive Summary

A. Market Definition

The U.S. smartphone market consists of all firms throughout the world that manufacture and sell smartphones to U.S. consumers. A smartphone is a mobile electronic device which runs an advanced operating system that is open to installing new applications, is always connected to the internet, and which provides very diverse functionality to the consumer.

The major participants in the U.S. smartphone market include Apple Inc. (a U.S. corporation), Research in Motion Limited (or RIM, a Canadian corporation), HTC Corporation (a Taiwanese corporation), Motorola, Inc. (a U.S. corporation), and Samsung Electronics Co. Ltd. (a subsidiary of the Korean corporation Samsung Group). Smaller participants include HP/Palm, Inc. (a subsidiary of HP, a U.S. corporation), LG Corp. (a Korean corporation), and Nokia Corporation (a Finnish corporation).

B. Threat Analysis

In general the smartphone market is rapidly changing, with constant product introductions. It is characterized by quickly evolving technology and designs, short product life cycles, aggressive pricing, rapid imitation of product and technological advancements, and highly price sensitive consumers. Self-elasticity and cross-elasticity are high. No one firm in the market has sufficient market share to control prices, resulting is strong rivalry and competitive pricing. The barriers to entry are high due to the existence of patents, high fixed costs and economies of scale, regulation, and brand loyalty.

The individual market participants engage in attempts at product differentiation, some being more successful than others. The standout is Apple, which has successfully differentiated its iPhone, and stands a good chance of maintaining that differentiation due to its closed and all-inclusive model or development and use.

C. Intermarket Effects

Intermarket effects are significant in the U.S. smartphone market. Multiple other markets have an effect on the U.S. smartphone market: from the suppliers, to the industrial designers, to the distributors, to the retailers, to the network service providers. Smartphone manufacturers make contracts with the network service providers for exclusivity of certain phones, and the providers in turn subsidize the cost of the smartphone for the consumer. Every smartphone user must purchase service with their smartphone, or the value of the smartphone is significantly diminished.
II. Background & Supply Chain

A. A Short History

As with many electronics industries, the smartphone industry is rapidly changing and highly competitive. New and distinctive products are being developed continuously, and released almost weekly. For this reason, the landscape of the market can change dramatically from one year to the next, or even from one month to the next. It is also a relatively young industry, and especially in the United States, some of the major players today hardly existed ten years ago.

The predecessors of today’s smartphones are yesterday’s personal digital assistants (PDA) and mobile phones. Mobile phones gave consumers the convenience of having a phone wherever they went, while PDA’s gave consumers the ability to easily carry around all of their personal information (address book, calendar, note pad, etc.) and have access to their email or other data. The smartphone began as an amalgamation of these two devices, giving consumers the convenience of one device that performed both functions.

Arguably, the first smartphone was developed by IBM in 1992. “Simon” was a mobile phone, but it also included a calendar, address book, world clock, calculator, note pad, e-mail, fax functionality, and games. Then in 1996, Nokia came out with the first in what is now a long line of relatively popular smartphones, the Nokia 9000. It also included all of the functionality of a dedicated personal digital assistant (PDA) – such as calendar, address book, note pad, and email – in the slim form factor of a mobile phone. In 1997, Ericsson released the GS88, the first device to be labeled a “smartphone.”

Then, in the early 2000’s, the market started to get more crowded as the advance of technology drove down prices and enabled more and more features in smartphones. Microsoft released a new version of the Pocket PC operating system for use with smartphones, eventually leading to numerous Windows Mobile Smartphones from many manufacturers. Handspring began releasing smartphone devices based on the Palm OS, and Research in Motion (RIM) released the first BlackBerry phone.

5 Id.
7 Id.
8 See http://www.stockholmsmashome.org/history/.
9 John Morris, Josh Taylor, Microsoft Jumps In The All-In-One Game, zdnet.com, Nov. 12, 2001.
The market has evolved considerably in the last eight years, and it has become ever more complex. More than 250 million smartphones will be sold worldwide in 2010, a 67 percent increase over 2009. In the United States, at the end of the third quarter of 2010, 28 percent of mobile phone users had smartphones, up from 21 percent at the end of 2009. The United States makes up around 23 percent of the total world smartphone market.

In the last eight years the group of major players has changed. Consumer preference has drastically changed. Advances in technology have enabled competing firms to produce ever more feature-rich devices. Additionally, the global market, both in terms of the major players involved, and the types of devices that are sold, is quite different from the U.S. market.

Thus, this market report will focus exclusively on the U.S. smartphone market, even though every player in the U.S. market also has a global presence. Also, although this report will stay focused on firms that actually manufacture smartphones, it will also discuss information about other types of firms as it is necessary to describe the numerous inter-market effects. This is necessary because an understanding of the smartphone market today requires an awareness of the many different and highly interconnected industries involved. Some of these issues will be introduced and discussed next.

**B. Software vs. Hardware**

The smartphone device itself is made up of two primary parts: the hardware (consisting of the screen, processor, memory, keyboard (if it has one), radio, packaging, etc.), and the software that runs on the hardware. While every smartphone firm is involved in the design and manufacture of the hardware of their phones, they are not necessarily heavily involved in the primary development of the software that runs on their phone.

From the early-2000’s to today, smartphone market players have competed primarily based on one of two models: (1) firms which manufacture their own hardware and license the software that runs on the smartphone from another firm, or (2) firms which manufacture the hardware and develop the proprietary software that runs on the device. Firms falling into category two have control of the whole development of their device, while those in category one are reliant on the software development firm for part of the smartphone production.

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12 IDC, Worldwide Quarterly Mobile Phone Tracker, Nov. 4, 2010.
16 Id.
17 E.g., the widely used Android OS is developed primarily by Google, while Windows Mobile and Windows Phone 7 are developed by Microsoft.
18 E.g., HTC, Motorola, Samsung, LG.
19 E.g., Apple, RIM, HP/Palm.
The hardware development itself is a complex process that requires bringing together suppliers of many different parts including: audio chips, baseband & application processors, camera technology and subsystems, input technology, multimedia chipsets, wi-fi chips, plastic and mechanical parts, RF components, etc. A manufacturer must assemble all of the devices that come from suppliers according to their specs and make it function and look the way they want.

This market report is focused on smartphone manufacturers, and thus any firm that exclusively develops software for smartphones (such as Microsoft, with their Windows Mobile OS) is not heavily covered. But understanding the operating system market is important to understanding the smartphone market, as the operating system is a major part of what a consumer interacts with on their smartphone.

### C. Operating Systems

Smartphone operating systems (“OS’s”) come in three forms: (1) proprietary, (2) licensable, and (3) open source. Smartphone manufacturers strategically chose which OS model to follow based on their core strengths.

Proprietary OS’s are developed in-house by smartphone manufacturers that manage the whole device development. Apple, RIM, and HP/Palm all take this approach with their iOS, BlackBerry, and webOS operating systems respectively. The proprietary approach gives the manufacturer a potential competitive edge over rivals as it allows the manufacturer to differentiate their smartphones from any others. It also allows them to more tightly integrate the function of the OS and the hardware of the phone. All this comes at a high cost, as the software development is time consuming and expensive.

Licensable OS’s allow any manufacturer to use the OS for a device they produce. Microsoft makes the most popular of these OS’s with Windows Mobile and the recent Windows Phone 7 operating systems. Licensable OS’s are largely used “as-is” with a manufacturer’s unique hardware, although some customization is available. Windows Mobile is highly customizable by the smartphone manufacturer, while Windows Phone 7 is less so. In both cases, the colors that are used can be changed, and with Windows Mobile the whole look of the OS can be altered.

Smartphone manufacturers chose a licensable OS because of the reduced costs of developing an operating system, but licensing can be expensive also. They also are able to take advantage of an existing ecosystem of OS users who are familiar with the OS, and who potentially have invested money into software applications that only run on that OS. Additionally, Microsoft provides well established tools for development of additional software for the OS. Differentiation is more difficult

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21 See the section on smartphone OS’s below.
24 Id.
25 Id.
with this approach though, and mainly comes in the form of unique hardware, or proprietary software applications that the manufacturers develop and then put on the phone with the licensable OS.

Open source OS's give the smartphone manufacturer access to an existing operating system that is free, and freely customizable. The most popular open source OS is Android, but others include Symbian OS and MeeGo. Android was released as open source by Google under a license that allows anyone of take the OS and use it in any way, included adding proprietary enhancements, without contributing those enhancements back to the open source operating system. This allows smartphone manufacturers to use the Android as a highly developed starting point for their smartphone OS, at no cost, and build off of it. This openness has made Android highly popular among smartphone manufacturers.

D. Wireless Service Providers

A smartphone device only become useful when mated with a wireless service provider that allows the consumer to make voice calls and access data such as email and the internet. Thus, a buyer that is looking to purchase a smartphone has at least two decisions to make: the smartphone that they would like to buy, and the service provider that they are going to use. Wireless service providers have varying degrees of coverage and service options, as well as different pricing plans for both voice and data service.

In order to facilitate the smartphone buying process, many smartphone manufacturers contract with wireless providers to allow the consumer to purchase a smartphone and a wireless plan simultaneously. Most of the time the contract includes an agreement for phone exclusivity (meaning that the manufacturer agrees to only make a particular phone available through that particular wireless provider). Thus, many times, when a consumer choses a particular smartphone, they must be aware that it may only be available with one wireless service provider. Or, likewise, when a consumer chooses a particular provider, they will be limited as to what smartphones they can choose. Consumers must also consider the network coverage of the service provider in the area that they are using their smartphone.

28 Symbian OS and MeeGo are both used in Nokia smartphones. Worldwide, devices based on Symbian OS accounted for 36% of smartphone sales in 2010 Q3, but in the U.S. they accounted for almost none. Thus, these two OS's will not be further discussed in this market report.
30 See the section on market share below.
31 See Cnet.com’s overview of the different wireless providers: http://reviews.cnet.com/2719-3504_7-389-2.html?tag=page;page
The consumer making a buying decision also oftentimes finds themself in a long-term contract with the provider for service, requiring that they stay with that provider to avoid large early termination fees.\footnote{http://www.ucan.org/telecommunications/wireless/cell_phone_termination_fees.} This results when a consumer purchases a smartphone and accepts a one or two-year contract with the provider for a subsidized price on the smartphone. If the consumer needs to replace the original smartphone due to loss or destruction before the end of the contract term, they will be limited to the only those smartphones that are available from the particular service provider.

Additionally, the wireless service provider market in the United States is made up of competing firms that have incompatible networks.\footnote{See \url{http://en.wikipedia.org/wiki/List_of_United_States_wireless_communications_service_providers}.} Many smartphones are manufactured with radios that will only allow them to function with one or two of the networks, but not with all of them. While it is possible to manufacture a smartphone that is compatible with all of the U.S. service providers (often referred to as “unlocked” phones\footnote{See, e.g., HTC Touch Cruise at \url{http://www.htc.com/us/products/htc-touch-cruise?view=1-1&sort=0&filters=6-0-0}.}), most smartphones are not so manufactured due to increase complexity and cost. Thus, from the manufacturers’ point of view, contracting with a provider for exclusivity has the advantage of driving down the cost of the phone, because only one type of compatibility has to be included. This, of course, comes at the expense of consumer choice of carriers.\footnote{\url{http://www.consumersunion.org/campaigns/learn_more/000960indiv.html}.}

Ideally, a consumer would have the option of purchasing a particular smartphone and using it with any wireless service provider they desired. Some firms do produce smartphones that work with any provider. Unfortunately, this results in a more complicated buying decision for the consumer, because it may not be possible to purchase the phone and the service simultaneously (from, for example, a service provider’s website or brick-and-mortar store). Consumers who are interested in these so-called “unlocked” phones are the types that are interested in greater choice at the expense of some convenience. They are likely more tech-savvy consumers.

The vast majority of smartphones are made to work with only one provider, and the provider’s logo often appears on the front of the phone along with the manufacturer’s logo.

\section*{E. Purchasing Options}

New smartphones can be purchased directly from the manufacturer (via the internet or a brick-and-mortar store), through another retail outlet (excluding wireless service providers) (via the internet or a brick-and-mortar store), or from the wireless service providers (again, via the internet or a brick-and-mortar store).\footnote{See \url{http://www.consumerreports.org/cro/magazine-archive/2010/june/shopping/where-to-buy-a-cell-phone/overview/index.htm}.}

Exclusivity contracts between wireless service providers (or other retail outlets) and the smartphone manufacturers limit the number of places that particular smartphone can be purchased.
Oftentimes, when providers fail to secure exclusivity contracts for particular smartphones, they do not then carry them in their stores. Thus, a consumer that is interested in purchasing a phone that can function on any of the service provider networks might not be able to purchase it through any provider’s website or brick-and-mortar store; they would likely have to go to the manufacturer’s website to purchase the phone.\textsuperscript{39}

Smartphones are usually purchased with a one or two-year contract with the service provider. Providers subsidize the cost of the smartphone when it is sold with a contract for service, making the initial cost of the smartphone lower than it would be if the consumer was to purchase the phone outright.\textsuperscript{40} A new smartphone can be purchased without a contract. The consumer then has higher upfront costs, but then has the freedom of obtaining service without a long-term contract.\textsuperscript{41}

Used smartphones can be purchased through internet websites where used goods are sold, or through other classified ads. A used smartphone can then be activated with the wireless service provider. Typically consumers interested in purchasing used devices are more tech-savvy and/or cost conscious, and don’t mind the added complexity of finding the correct smartphone for a particular network provider.\textsuperscript{42} Buying a used smartphone outright will potentially lower the upfront cost and the long term costs of the smartphone and wireless service.

\textbf{F. Apps}

Software applications, or “apps,” are a significant part of the smartphone market today. Every smartphone operating system has an online store where apps can be purchased and downloaded to the smartphone to extend the functionality of the smartphone. These purchases can be made directly from the phone, and include very diverse functionality: games, over-the-internet radio, exercise trackers, maps and GPS navigation, note taking, wordprocessing, etc.\textsuperscript{43} Apps constitute a complementary product to the smartphone, with cross-elasticity of demand, and are a source of revenue for the company that runs the app store. Low priced or free apps, easily available through an easy to use app store have had a significant impact on Apple’s sales of its iPhone for example.\textsuperscript{44}

Manufacturers that develop their own proprietary OS (such as Apple, RIM and HP/Palm) also have apps stores that are exclusive to the operating system. This makes sense because apps for each OS must be done separately. Licensable or open source operating systems have app stores that

\textsuperscript{39} Evidence for this proposition was collected by the author through surveying current smartphone offerings from each of the major manufacturers, and finding where they were available on carriers’ websites. One exception to this general rule is RIM, where many of its BlackBerry phones are available on multiple carriers’ websites.


\textsuperscript{41} Id.

\textsuperscript{42} http://cellphones.lovetoknow.com/Buying_Used_Cel...CellsPhones.


\textsuperscript{44} See http://digitaldaily.allthingsd.com/20090831/apple-to-rivals-thanks-for-the-free-advertising/.
work with any device that runs the OS, no matter the manufacturer. There are a few minor exceptions to these guidelines, for example Samsung has an app store for Windows Mobile devices that is specific to their phones, and Amazon.com has recently started an app store for Android devices.\(^\text{45}\)

The current major app stores include: The App Store (for Apple iOS devices), BlackBerry App World (for RIM BlackBerry devices), Palm App Catalog (for HP/Palm webOS devices), Android Marketplace (for Android devices, owned by Google, not a smartphone manufacturer), and Windows Mobile Marketplace (for Windows Mobile Phones, owned by Microsoft, not a smartphone manufacturer), and Windows Phone Marketplace (for Windows Phone 7 Devices, owned by Microsoft, not a smartphone manufacturer). Of note is the fact that for Apple iOS devices, the App Store is the only source of apps, they cannot be installed from any other source. In all other cases, the corresponding app store is not the exclusive source of software applications.\(^\text{46}\)

Consumers find great value in apps because of the additional functionality that they can obtain from their smartphone.\(^\text{47}\) Manufacturers promote apps because they are valuable both for the revenue that they get from selling apps (if the app store is for a proprietary to the manufacturer), and for the effect of consumer lock-in.\(^\text{48}\) While many apps are available for free from the app stores, purchasing an application means that a consumer has made an additional investment into the manufacturer’s smartphone. This can have a different effect depending on the app store model. Under the proprietary model, where the operating system and app store are owned by the smartphone manufacturer, this effectively increases the switching costs for the consumer, because the app they bought is not going to be available on any other manufacturer’s smartphones.\(^\text{49}\) Under the open source or licensable model, the switching cost is not specific to the manufacturer, but rather to the OS. This thus has reduced value to these manufacturers as compared to those under the proprietary model.

Inasmuch as apps are important for consumers, smartphone manufacturers have the added difficulty of attempting to draw app developers to their OS platform (or the one that they are adopting).\(^\text{50}\) The robustness of the app store catalog is thus also going have an effect on what OS a manufacturer decides to adopt. This adds another dimension of complexity to the smartphone market.

\(^{49}\) Id.
III. U.S. Smartphone Market Today

A. Market Definition

The U.S. smartphone market consists of all firms throughout the world that manufacture and sell smartphones to U.S. consumers. A smartphone is a mobile electronic device which runs an advanced operating system that is open to installing new applications, is always connected to the internet, and which provides very diverse functionality to the consumer, including phone, text, email, calendar, address book, games, music, video, camera, maps and GPS, etc.\(^{51}\) A smartphone is more than a typical feature phone in that it provides significantly greater functionality than just a calling and other basic functions, and it typically has a large screen.\(^{52}\)

The participating firms in this market will be described next. Following that, the bases of competition will be presented. Then, the nature and characteristics of the market will be discussed. An analysis of the market at the firm level will then be presented, followed by a brief analysis of the intermarket-level effects.

1. Market Participants

The participants in the U.S. smartphone market include all manufacturers of smartphones that sell smartphone devices in the United States. The major participants include Apple Inc. (a U.S. corporation), Research in Motion Limited (or RIM, a Canadian corporation), HTC Corporation (a Taiwanese corporation), Motorola, Inc. (a U.S. corporation), and Samsung Electronics Co. Ltd. (a subsidiary of the Korean corporation Samsung Group). Smaller participants include HP/Palm, Inc. (a subsidiary of HP, a U.S. corporation), LG Corp. (a Korean corporation), and Nokia Corporation (a Finnish corporation).

2. Market Shares/Value Pool

Estimating the market shares of the participants in the U.S. smartphone market is difficult. Because many of the market participants are international or multinational corporations, sales and financial figures relating strictly to smartphones are difficult to find. Additionally, even when the revenue figures are available, oftentimes all mobile devices are lumped into one figure, and smartphones are not separated out. Finally, sales figures are rarely broken down to U.S. only sales, and every participant has sales all over the world.\(^{53}\)


\(^{53}\) See, for example, Apple’s recent 10-K filing that does not break out U.S. iPhone sales explicitly: http://www.sec.gov/Archives/edgar/data/320193/000119312510238044/d10k.htm.
Worldwide sales numbers for mobile device manufacturers are highly misleading. For example, Gartner reports that Nokia, Samsung and LG are the top manufacturers of mobile devices (see Table 1), but in the U.S, Nokia and LG hardly have a presence in the smartphone market.\textsuperscript{54}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
Company & 3Q10 Units & 3Q10 Market Share (%) & 3Q09 Units & 3Q09 Market Share (%) \\
\hline
Nokia & 117,461.0 & 28.2 & 113,466.2 & 36.7 \\
Samsung & 71,671.8 & 17.2 & 60,627.7 & 19.6 \\
LG & 27,478.7 & 6.6 & 31,901.4 & 10.3 \\
Apple & 13,484.4 & 3.2 & 7,040.4 & 2.3 \\
Research In Motion & 11,908.3 & 2.9 & 8,522.7 & 2.8 \\
Sony Ericsson & 10,346.5 & 2.5 & 13,409.5 & 4.3 \\
Motorola & 8,961.4 & 2.1 & 13,912.8 & 4.5 \\
HTC & 6,494.3 & 1.6 & 2,659.5 & 0.9 \\
ZTE & 6,003.6 & 1.4 & 4,143.7 & 1.3 \\
Huawei Technologies & 5,478.1 & 1.3 & 3,339.7 & 1.1 \\
Others & 137,797.6 & 33.0 & 49,871.1 & 16.1 \\
\hline
Total & 417,085.7 & & 493,084.7 & 100.0 \\
\hline
\end{tabular}
\caption{Worldwide Mobile Device Sales in 3Q10 (in thousands of units).\textsuperscript{55}}
\end{table}

In order to get a better idea of smartphone manufacturer market share in the United States, it is helpful to look at a proxy that is available: quarterly sales by smartphone OS. Smartphone OS sales have the advantage of giving a clear indication of the size of the market share held by manufacturers that follow the proprietary OS model, i.e., their OS is only available on their smartphones. Unfortunately, for smartphones that run a licensable or open source OS, this proxy for market share gives very little information about the respective manufacturers.

Figure 1 and Figure 2 summarize U.S. smartphone market share by OS. Here we see that Apple has 26 percent of the market, while RIM has 24 percent. After that, the data is less useful because the Android market share is made up of all manufacturers of Android phones. This group includes HTC, Motorola, Samsung, and LG. The data on Windows Mobile has the same problem as that of Android, but the market share of the Windows Mobile OS has become so insignificant in recent years that it is not especially important to understand the manufacturer breakdown of that segment of the market. HP/Palm and others also make up a very small portion of the market.


\textsuperscript{55} Gartner 2010, http://www.gartner.com/it/page.jsp?id=1466313
Figure 1: Unit Sales Of Smartphones By OS 3Q10.\textsuperscript{56}

Figure 2: Smartphone Shipments by OS Vendor 3Q10.\textsuperscript{57}


\textsuperscript{57} Id. OHA refers to the Open Handset Alliance, which is made up of all manufactures of Android devices, and a number of other companies.
To get an idea of the respective market shares of the remaining manufacturers (HTC, Motorola, Samsung, and LG) investigating individual sales figures for each is the best method.

HTC reported last year in its annual report that it sold 5.5 million to 6 million smartphones to U.S. consumers.\textsuperscript{58} HTC has also indicated that this year’s sales are even larger.\textsuperscript{59} Given the rapidly growing market, this would likely put HTC at well over 2 million smartphones sold in the United States in the third quarter of 2010.

Samsung U.S. smartphone sales can be surmised from its recent announcement about sales of its flagship smartphone launched in July, the Galaxy S. Samsung reported that it has sold 3 million of its Galaxy S smartphones in a 4 month time span\textsuperscript{60}, giving it approximately 2.25 million sales in the third quarter of 2010.

Motorola recently reported that it sold 3.8 million smartphones worldwide in the third quarter of 2010.\textsuperscript{61} Also, Motorola has in recent years lagged behind Samsung in smartphone sales, but has had a larger U.S. presence.\textsuperscript{62} Thus, Motorola’s U.S. smartphone sales are likely around 2 million for the third quarter of 2010.

LG is reportedly expecting to sell 6 million smartphones worldwide in 2010,\textsuperscript{63} making them likely the smallest of the manufacturers in the United States. Sales of LG smartphones in the U.S. are probably much less than 1 million in the third quarter of 2010.

In all, HTC, Samsung and Motorola seem to be in a present battle to gain market share, all currently standing relatively equal footing. LG lags behind. But things change in the smartphone world very rapidly, and the launch of one successful smartphone can rapidly grow the market share of one firm over another.

It is also noted that while this one measure of market share, sales of new phones, is helpful in understanding the market power of the respective firms, it does not tell the whole story. Installed base is important also, especially to take advantage of network effects associated with a particular platform (these issues will be further discussed below). Nielsen provides some data on current market share of smartphone OS’s by number of users. Figure 3 shows that Windows Mobile may have a larger current user base than is reflected in the current sales numbers. The figure also shows


\textsuperscript{59} Id.


the trend of decreasing market share for Windows Mobile devices, and the increasing share of Android devices.

Another item to note is that market share in the smartphone business is not entirely indicative of market power. This is because profit margins for the market participants vary widely. Apple for example has been very successful at both selling large numbers of smartphones, and keeping its profit margins very large (see Figure 4), but note that the chart shows profit margins for all phone sales, including feature phones. Other manufacturers have not been so successful, some even taking a loss in their smartphone business as they try to compete, such as Motorola and LG. The larger profit margins of Apple and RIM give them greater market power because they can compete by lowering prices if they desire.

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3. **Summary**

What is clear is that the value pool for smartphones in the United States is large, and it is growing rapidly, despite hard economic times. Apple and RIM are the market leaders, but while Apple is on the way up, and a RIM seems to be on the way down. Other contenders include HTC, Motorola, Samsung and LG, all of whom are competing today primarily by developing Android, Windows Mobile, and Windows Phone 7 (more on this next) smartphones. HP/Palm is also in the market, but struggling to stay afloat. But, the market is also changing very quickly, and a smartphone manufacturer that is on top at any given time, might not be a year later. Constant innovation and development is required. Also, it should be noted that although the market shares are a good indication of the success of each firm in the market, there is not a strong correspondence to the profitability of the firm. Some firms are more successful at attaining high profit margins, while others are not.\(^{67}\) Larger profit margins give participating firms significant leverage with which to compete with other smartphone manufacturers. The ways in which some firms achieve these higher profit margins will be discussed below.

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B. Bases of Competition

Consumers make smartphone buying decisions based on a large number of factors. More and more consumers are looking for their smartphone to replace many of the other electronic devices that they previously carried around (cell phone, pager, watch, camera, video camera, pedometer, laptop, etc.), so the number of features in the phone is often an important buying decision. Some of the characteristics that consumers consider include:

- **Aesthetic**
  - Stylishness/Look/Color
  - Weight and Size
  - Perceived Prestige
- **Hardware Functionality**
  - Camera(s)
  - Battery Life
  - Quality/Resolution of Screen
  - Keyboard Type
  - Microphone and Speakers
  - GPS
  - Tethering
- **Software Functionality**
  - Ease of use
  - Operating System/Openness
  - Browser capability
  - Built-in/Exclusive Apps
  - Availability of Apps/App Store
  - Sync with Contacts and Mail
  - Support for Enterprise Services such as:
    - Encryption
    - Microsoft Exchange
    - Integration with Social Networks
- **Service**
  - Compatible Networks
  - Quality and Speed of Network
  - Price of Service (Voice and Data)
- **Other**
  - Price of Device

Features and functionality are the main drivers of smartphone buyers’ decisions. Fifty-eight percent of consumers who own or plan to purchase a smartphone state that embedded features such as size, quality, camera and keyboard style, as well as price, have the most influence on their buying decision. Apps currently have a relatively small influence on buyers’ decisions, but this is rapidly changing as consumers find that valuable apps can save them from carrying multiple devices around. As apps become more important to consumers, it will have a major impact on smartphone sales. Right now 65 percent of smartphone owners are downloading and using apps.

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69 This list of bases of competition was developed by the author through reading reviews of phones on Amazon.com, reading message boards, talking to friends and relatives, and reading consumer group materials like Consumer Reports.
71 Id.
72 Id.
73 Id.
Price is the biggest reason that potential consumers choose not to buy a smartphone. Of mobile phone buyers that did not end up buying a smartphone, 53 percent cited the high cost of data plans as the reason, while 28 percent concluded they didn't need the features.\textsuperscript{74}

Forty-four percent of consumers state that they use their smartphones for personal and business purposes.\textsuperscript{75} A consumers’ employer thus can have an effect on their smartphone buying decision. Because smartphones are oftentimes only available from one particular service provider, if the consumer’s employer has a contract with a particular provider then the phones they can chose from which can be used for business and personal purposes will be limited.\textsuperscript{76} Also, the smartphone they chose must be compatible with the employer’s network, further limiting a consumer’s choice. Security becomes a top priority when business is involved also. Forty-one percent of consumers state that the security of their smartphone is a top priority.\textsuperscript{77}

Consumers are also conscious of the quality and comprehensiveness of the network coverage of the service provider that has the smartphone they are considering.\textsuperscript{78} Nothing is more aggravating to a consumer than inadequate service coverage once they have purchased a smartphone.\textsuperscript{79}

Another major factor that consumers consider when purchasing a smartphone is the operating system (OS) that runs on it. Seventy-two percent of smartphone buyers reported caring about the OS that ran on the device.\textsuperscript{80} This is an area where consumer preference is rapidly changing. Figure 5 and Figure 6 show how rapidly consumers have become more interested in Android. Today, it is likely that a plurality of consumers would prefer Android to be running on the smartphone that they buy, when there were hardly any a year ago. Because the OS is such a large part of the smartphone device, and because consumer preference is changing so rapidly in this area, smartphone OS’s are further discussed and presented next.

\textsuperscript{79} Jacqui Cheng, Apple Hit With Class-Action Lawsuit Over iPhone 3G Flakiness, arstechnica.com, August 20, 2008.
C. Smartphone Operating Systems

The various types of operating systems and the respective models were introduced above: proprietary, licensable, and open source. Each of these models of OS's has different benefits and costs that a prospective buyer may consider. Some of the important characteristics of each are presented in Table 2, and will be discussed next.

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1. Android

The Android OS has an open source model that enables any manufacturer to take it and implement it for free on their hardware. This model gives manufacturers low cost of entry, and customizability with which to differentiate their phones. The combination of these characteristics has made Android increasingly popular with manufacturers, as evidenced by its wide acceptance and majority market share. Android smart phones are manufactured by HTC, Motorola, Samsung, LG, and others. Hardware configurations available are numerous: many sizes of screens, various cameras, different types of

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83 Information collected from various Wikipedia pages, OS and manufacturers’ websites, and the author’s own knowledge.
85 See the section below on each respective manufacturer for sample of the smartphones they produce.
keyboards, options for tethering (giving the user the ability to access the internet on his laptop through the smartphone), GPS, etc. The Android Marketplace is large and growing (over 100,000 apps), giving the consumer many options for expanding the capability of their smartphone. Android phones are available on all service providers. Because the OS is customizable, there is some lack of uniformity from one smartphone to the next, but an app purchased on one Android smartphone will work on any other Android phone. Additionally, Android is open, and so apps can be installed on an Android phone from any place the user desires, i.e., they are not limited to Android marketplace.

2. iOS

iOS is the Apple-developed proprietary smartphone OS that exists only on the iPhone. Because the iPhone and iOS are exclusive to one another, from the consumer’s perspective, they are essentially the same thing. iOS is tightly integrated with the iPhone hardware, and it was one of the first smartphones to have a very smooth touch interface, something that has now become the standards on a majority of smartphones. The Apple App Store is the largest of the smartphone app stores (with 300,000 apps), giving consumers a huge assortment of apps they can put on their smartphone. But, because of its closed nature, apps purchased at the App Store will only work on the iPhone. Also, the App Store is the only allowed source of apps for iOS. iOS and the iPhone are currently only available in the AT&T network (but this may be soon to change), something that might not appeal to some consumers who live where there is not adequate network coverage to use the phone effectively. But, iOS has tight integration with the Apple ecosystem, including iTunes and existing iPod playlists. The tight control that Apple has over the iPhone experience has made it a successful device, with high user satisfaction (see Figure 7).

3. **BlackBerry OS**

The BlackBerry OS follows the same proprietary model of iOS. It is only available on RIM BlackBerry smartphones. Unlike iOS though, the BlackBerry OS comes on smartphones of many different hardware configurations: touchscreen or not; hardware keyboards of different types, different sized screens and phone sizes, etc. BlackBerry smartphones are available on any of the service providers’ networks, and unlike smartphones from many other manufacturers, the same smartphones are available from various providers. RIM has an app store called App World, but it is relatively new and small compared to the more established stores from Android and Apple. BlackBerry smartphones are especially successful and appealing to security conscious users because it is the only platform that supports full device encryption and encrypted communication.

4. **Windows Mobile**

Windows Mobile is a smartphone OS developed by Microsoft, that is licensable by any hardware manufacturer that would like to build a phone around it. It is a very feature-rich OS, but one that is not amenable to the type of touch interface that

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consumers expect on a smartphone today, so it is becoming less and less relevant. Nonetheless, smartphones running Windows Mobile are still manufactured by HTC, Motorola, Samsung and LG. Smartphones running Windows Mobile are available on every service providers network. They appeal to business customers especially because they are tightly integrated with Microsoft enterprise software that many businesses use. A relatively new app store for Windows Mobile smartphones was launched in 2009 by Microsoft, but prior to that time many apps existed for the platform that could be downloaded from various sources on the internet. Microsoft is effectively replacing this operating system with its modernized OS Windows Phone 7 that was recently released.

5. **webOS**

webOS follows the closed, proprietary, model of BlackBerry and iOS. It is only available on HP/Palm devices. webOS is a young OS, which was first released in June of 2009. It is available on a few different hardware configurations from HP/Palm, all of which feature a hardware keyboard. The Palm App Catalog is a relatively new app store with not many apps. webOS smartphones are available on all the major service providers' networks, but only certain phones are available on each. webOS excels at integration with social networks and integration with various contacts platforms, making it an appealing OS for the consumer who likes to do social networking from their phone.

6. **Windows Phone 7**

Windows Phone 7 is essentially Microsoft’s replacement for its aging Windows Mobile OS, although it is a completely new OS. It follows the licensing model of Windows Mobile, but it less customizable by the smartphone manufacturers. This has the advantage of providing a unified user experience from one device to the next, something that the proprietary OS’s benefit from. Windows Phone 7 just recently became available, but it is already being adopted by all the big smartphone manufacturers (HTC, Motorola, Samsung, LG), and is available in many different configurations and on any major service provider's

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99 See http://www.palm.com/us/.
100 See http://en.wikipedia.org/wiki/Palm_App_Catalog.
103 See the firm specific analysis below.
network. A new app store is available, the Windows Phone Marketplace, which is expected to grow significantly in the coming year. Windows Phone 7 has excellent integration with social networking sites and other Microsoft platforms, and it features a highly stylized interface.

IV. Threat Analysis in General

This report will first address key threats that apply to all of the firms in the U.S. smartphone market, and then move on to threats that are specific to individual firms. In general the smartphone market is rapidly changing, with constant product introductions. It is characterized by quickly evolving technology and designs, short product life cycles, aggressive pricing, rapid imitation of product and technological advancements, a highly price sensitive consumers. No one firm in the market has sufficient market share to control prices, resulting is strong rivalry and competitive pricing. The barriers to entry are high due to the existence of patents, high fixed costs and economies of scale, regulation, and brand loyalty. Intermarket effects are significant with the existence of ubiquitous contracts between smartphone manufacturers and network service providers for phone exclusivity and subsidization. A consumer must purchase service along with a phone, or its usefulness is significantly diminished.

A. Substitution

Substitution is a significant threat to smartphone manufacturers. The market is characterized by constant product introductions, quickly evolving technology and designs, short product life cycles, aggressive pricing, rapid imitation of product and technological advancements, a high price sensitivity of consumers. Although the technological innovation is rapid in the smartphone market, any edge a particular firm might obtain, whether it be technological or industrial, is diminished by rapid imitation. With some exceptions, smartphones from most manufacturers at any given time have relative feature parity in many respects, making substitution relatively easy from the consumer's perspective. Although no specific numbers are available, the evidence points to relatively high self-elasticity of demand. Smartphone manufacturers compete heavily on price, and small changes in price often result in increases in sales.

108 Flagship smartphone models from each manufacturer have price parity when purchased through a wireless service provider. Slightly older models again have price parity with each other very quickly. See smartphone listing on any major carrier's website such as att.com, verizon.com, or sprint.com.
Cross-elasticity is also high for smartphones. The primary competitor outside of the smartphone market is the feature phone.\textsuperscript{110} As explained above, the primary reason that consumers chose to go with a feature phone instead of a smartphone is the price of the phone. A consumer who does not have a need for the additional features of a smartphone, but just requires basic functionality (voice calls, texting, etc.) will choose a feature phone. Additionally, choosing a smartphone requires both a larger upfront cost, and higher ongoing cost for a data plan. Feature phone buyers do not have the ongoing cost of a data plan. Feature phone buyers also may not see the added functionality of a smartphone as being valuable enough, when they already own dedicated devices that provide the functionality (cameras, GPS devices, laptops, etc.).\textsuperscript{111} Thus, the highly elastic demand for smartphones makes substitution a large risk.

There are a number of things that smartphone manufacturers do to counteract the high self- and cross-elasticity. One is to take advantage of complementary demand for apps, and that associated lock-in.\textsuperscript{112} Apple does this most effectively by maintaining a closed system in which they are the only source of apps for the iPhone. Apps bought for the iPhone cannot be used on any other device, thus the consumer must make a sacrifice if they would like to substitute their iPhone for another smartphone. Apple also effectively ties in their whole ecosystem to the iPhone through iTunes, their software through which a user can purchase music, TV shows, movies, and audiobooks, and sync them with their iPhone.\textsuperscript{113}

\textbf{B. Threat of Entry}

Barriers to entry in the U.S. smartphone market are relatively high, but the rapid growth of the market is providing opportunities despite this.

\textit{1. Economies of Scale}

There are significant fixed costs associated with smartphone manufacturing. While most firms have the hardware of the phones manufactured overseas by foreign companies, the costs of developing the research and engineering personnel to design and test the smartphone and software can be prohibitively expensive for an entering firm.\textsuperscript{114} These fixed costs include not just the cost of the manpower, intellectual knowhow, intellectual property, computers, test equipment, prototyping devices and supplier and manufacturer contracts, but also the time necessary to develop all of these. Because the industry moves so quickly, an entering firm would either have to enter with existing resources targeting the smartphone market, or it would have to have another significant competitive

\textsuperscript{111} http://www.zdnet.com/blog/gadgetreviews/smartphone-vs-feature-phone-arms-race-heats-up-which-did-you-buy/6836.
\textsuperscript{114} http://www.thestreet.com/story/10921713/motorola-rd-reaching-more-comfortable-levels.html.
Finally, recouping the investment in the fixed and variable costs of entering the smartphone market requires selling a significant number of phones, making profitability a very difficult target.

2. **Intellectual Property**

Many parts of the smartphones hardware and software and protected by patents held by the big market participants. These patent holders have demonstrated that they are very willing to enforce their IP rights against others who attempt to implement features that seem to infringe on those patents. On an almost weekly basis one smartphone manufacturer seems to file a lawsuit against another (see Figure 8). These lawsuits are sufficiently expensive (up to $10 million) that any firm attempting to enter the market would have to have significant financial backing to deal with any patent lawsuits, not to mention damages that might result if infringement is found.

Even well-established and successful smartphone manufacturers are subject to barriers as a result of patent litigation. Apple has been the most sued technology company since 2008, the year after the iPhone was introduced, probably because if its success in sales of the iPhone. The most likely outcome of litigation between large smartphone manufacturers is an agreement to license each other’s patents, but this option is not available to new entrants who may have limited intellectual property available in the smartphone market.

3. **Commoditized Parts, but Not Engineering**

Many of the parts that make up the typical smartphone are readily available to any purchaser as they have been commoditized. These include many of the internal components such as the radios, processors, memory, battery, etc. The general availability of these parts lowers one potential barrier to entry. On the other hand, assembly of these parts in a package that is appealing to consumers is not commoditized. Some have theorized that smartphones will go the way of personal computers, where assembly is a simple task, but this ignores the fact that for many, the look and feel of the smartphone are as important as the internal parts. Significant know-how and time are required of industrial design engineers to effectively put together a compact handheld device that a consumer would be proud to carry around and enjoy interacting with.

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119 *Id.*
4. **Regulation**

There are some barriers related to governmental regulation of electronic devices. Electronic firms have to develop policies to abide by environmental regulations, and any radio transmitting device (such as a smartphone), must be approved by the FCC. Additionally, any sales in foreign countries must go through approval processes in those countries also.

5. **Market Growth**

As cited above, the smartphone market is rapidly expanding. More and more consumers are interested in purchasing a smartphone for the first time, looking for all the additional features and benefits that come with it as compared to a feature phone. By 2013 the market will likely have one billion smartphone consumers. When there is such growth, there are opportunities for companies that have sufficient capital to enter the market despite any barriers. Many existing corporations are

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124 See [http://stason.org/TULARC/pc/pc_hardware_faq/8_16_What_does_FCC_approval_cover_and_what_needs_to_be_approved.html](http://stason.org/TULARC/pc/pc_hardware_faq/8_16_What_does_FCC_approval_cover_and_what_needs_to_be_approved.html).
125 *Id.*
trying to get into the market. For example, HP recently purchased Palm outright, thus buying themselves into the smartphone market with Palm phones. Dell and Acer are attempting to enter the market also, although they are not focusing on the United States initially.\footnote{See http://www.mobielmarketer.com/cms/news/manufacturers/6285.html.}

\section*{6. \textit{Brand Loyalty}}

Brand loyalty is a potential barrier to entry, but it is generally low in the U.S. smartphone market.\footnote{http://www.techwatch.co.uk/2010/11/29/smartphone-owners-lack-brand-loyalty/\textperiodcentered.} There are some exceptions though. Companies such as Apple, and for many consumers, Palm, have a loyal following of consumers that goes back years.\footnote{See http://www.mobielmarketer.com/cms/news/manufacturers/6285.html.} These companies continue to develop the loyalty of their customers, raising an additional barrier to entry for any new competing firms. Entering the market and becoming a big player requires that a potential competitor convince existing customers that they will provide a better service than the existing brand, and that is difficult to do.

\section*{C. \textit{Rivalry}}

With rapid innovation necessary for a rapidly changing market, where customers are very price conscious, rivalry among firms in the U.S. smartphone market is fierce.

Firms in the smartphone market actively work to adopt the successful ideas and technology of their competitors. This has been the trend with large touch screens, touch friendly operating systems, embedded cameras, and availability of an easy to use app store, among other things. As consumers are more and more driven to purchase by the features that are available on the smartphone, there is a constant rivalry among firms to match each other on features.\footnote{See http://cell-phones.toptenreviews.com/smartphones/ for an example of the type of feature comparison that consumers engage in.} There is also an effort to stifle each other’s efforts to develop those technologies through obtaining of patents and filing lawsuits seeking injunctions and trade restrictions.\footnote{See http://www.wharton.universia.net/index.cfm?fa=viewArticle&id=1888&language=english for an analysis of why smartphone manufacturers file lawsuits against one-another.}

No particular firm in the market has a significant amount of market power; every firm is vying for a greater piece of the pie.\footnote{See the market share analysis above.} This has resulted in driving down of smartphone prices and relative price parity for flagship smartphones from each major firm.\footnote{http://www.mynewsdesk.com/us/view/pressrelease/the-race-of-smartphones-what-next-527816. See also the price equality between smartphones at att.com’s smartphone section.} Firms are heavily involved in price discrimination, pricing their phones differently based on the sale outlet. Smartphones sold through retailers are frequently cheaper than those sold through network service providers.\footnote{See http://www.abiresearch.com/press/1662-Average+Subsidized+Smartphone+Price+from+US+Operators+Rises+to+$117.08+in+April.}
The one exception to this is Apple. Apple maintains price equivalency no matter the outlet, and the prices it charges for its smartphones is in many cases much higher than its competitors. Because Apple has been able to do this, its smartphone sales are reportedly highly profitable, while smartphone sales for Motorola have not been profitable at all.\textsuperscript{135}

Rivalry also comes from outside the manufacturers’ market as other firms try to cash in on the smartphone profits. Google open sourced the Android OS so that it could find revenue from sales of apps and ads through the smartphones that run the OS. This cuts directly into Apple’s effort to become the dominant player in the smartphone manufacturer market, changing the nature of the market significantly.\textsuperscript{136} Such changes are likely to continue as other firms attempt to enter the market.

V. Firm-specific Threat Analysis

Although the market participants have common characteristics related to substitution, barriers to entry and rivalry, each firm also has some unique characteristics. Common characteristics include those that were discussed in the previous section. Self-elasticity and cross-elasticity are market specific characteristics, for example. On a firm-specific level, each firm has different ways to addressing the threat of entry or substitution, through differentiation and raising the barriers to entry, among other things. These will be explored in this section on a firm-specific basis.

Of note is the difference in structure between the proprietary model followed by Apple, RIM and HP/Palm, and the licensing or open source model followed by HTC, Motorola, Samsung and LG, and the effect that is has on the manufacturer response to threats. One industry analyst theorizes that these two models lie on an industry path that is continually cycling between vertical integration (proprietary) and horizontal integration (open source and licensable) (see Figure 9).


A. Apple

Apple takes advantage of significant synergies that are available within its ecosystem for computers, electronics and software. Prior to releasing the iPhone (see Figure 10), Apple’s only smartphone product, Apple had an existing broad base of users of its computers, iPod music players, and software such as iTunes. The iPhone integrates seamlessly with other Apple products such as the Apple TV, where the iPhone can be used as a remote control for the TV device. The advantages of these products were carried over and integrated into the iPhone, producing a highly integrated and differentiated user experience. Other firms attempting to copy this formula that Apple has put together, with its highly successful app store and music and movies available, and easily sync-able through iTunes, face significant barriers to entry. Replicating the experience of an iPhone consumer requires that a competitor develop not just a smartphone, but an integrated app store, and a powerful music player with a store for buying music, movies and TV shows. Many have attempted to replicate this with the introduction of syncing apps and apps stores, but it has proven difficult.

Apple also differentiates by maintaining a unique, simple and stylish design with its iPhone. The iPhone is considered by many a unique status symbol. The uniqueness of the iPhone is also

140 http://www.slideshare.net/korhan/apple-brand-experience-presentation.
141 http://www.technobuffalo.com/blog/apple/apple-is-now-a-status-symbol/. 
emphasized by Apple via price differentiation. Apple smartphones typically command a higher price than smartphones from other manufacturers. This maintains an air of high class surrounding the iPhone, but it has the added benefit of making sales of the iPhone more profitable for Apple than smartphones are for other manufacturers.

Apple enjoys significantly more market power than its market share warrants simply because it has much larger profit margins on its smartphone sales than many competitors. Apple achieves this by limiting its smartphone offerings to at most two models, and selling at a higher average price. Limiting the models simplifies the engineering process, and the coordination with assemblers and part suppliers.

Apple has very high brand loyalty, creating a significant barrier to others seeking to take market share from Apple. Apple’s closed and proprietary model leading to a very consistent experience, as well as its emphasis on ease of use has cultivated very high satisfaction among users, leading to even greater loyalty.

Apple only sells one or two types of smartphones. It sells the current model iPhone 4, and the previous generation iPhone 3GS. Within the new iPhone 4 category though, Apple sells different versions with different amounts of storage space, and different colors, at different price points. This enables Apple to discriminate between different types of consumers. Those that want an iPhone, but don’t have the money to purchase the top-of-the line device can still have one, but it might have a smaller amount of storage, or be a different color.

As explained previously, Apple is partially vertically integrated, providing both the hardware and the software for its smartphones. Further, they maintain exclusivity of the app store, and all devices that interface with the iPhone, including syncing the device with a computer, are controlled by Apple. This proprietary approach gives Apple total control over the user experience, allowing them to ensure that it is consistent, and of a high quality. Other manufacturers are oftentimes reliant on the work of other firms for the end-user experience, putting them at a potential disadvantage to Apple, assuming that experience is not as good as Apple.

Apple has also recently started taking advantage of network effects by introducing the “facetime” feature. Facetime allows users of iPhones that talk to each other with video. The video is only available to other iPhone users though.

The Apple formula has proven highly successful, even though for years Apple has been in an exclusive contract with AT&T for network service. Users of other networks have been willing to

142 Apple’s profit margins in iPhone sales are estimated to be 57%. http://www.brianshall.com/content/iphone-profit-margins-are-anything-gross.
143 See http://www.brianshall.com/content/iphone-profit-margins-are-anything-gross.
change over to AT&T for the advantage of using an iPhone, even if it meant changing carriers and experiencing potentially poorer coverage. One study showed that most smartphone buyers (72 percent) stick with their current carrier, even though only 58 percent were certain they would do so at the beginning of the buying process. But 19 percent switched carriers, and one commentator has pointed out that these were most likely individuals who wanted to switch to AT&T to get an iPhone.\textsuperscript{150}

![Figure 10: Apple iPhone 4 (available on AT&T).\textsuperscript{151}](image)

B. **RIM**

In many respects RIM follows a strategy similar to Apple’s to differentiate its products, but its target consumers are different. RIM is partially vertically integrated, developing its OS and hardware in-house. But RIM targets business consumers with a number of unique differentiating features.\textsuperscript{152} These include full device encryption, enabling end-to-end encrypted communications from the phone user to the business server. Neither Android, nor the iPhone has this capability.\textsuperscript{153} Additionally, BlackBerry smartphones all have a hardware keyboard that is very well liked by many

\begin{itemize}
\item \textsuperscript{149} http://seekingalpha.com/article/204421-the-complicated-tale-of-at-ts-exclusive-iphone-agreement.
\item \textsuperscript{151} http://www.apple.com/iphone/
\item \textsuperscript{152} http://knowledgenetwork.thunderbird.edu/research/2010/08/13/research-in-motion/.
\item \textsuperscript{153} http://searchmobilecomputing.techtarget.com/news/1324084/iPhone-encryption-is-a-must-for-the-security-conscious-enterprise.
\end{itemize}
users because it allows very efficient communications such as texting and email writing. While many Android phones can be had with a hardware keyboard, the iPhone only has a software keyboard option. (See Figure 11 and Figure 12 for two examples of currently popular RIM smartphones.)

RIM lagged behind Apple significantly in opening an app store, and the number of apps available has been limited. Unlike Apple, RIM allows apps to be installed on BlackBerry devices from any source, potentially allowing for a greater range of apps. But like Apple, RIM enjoys larger than average profit margins on its smartphone sales, giving it greater market power than the other market participants. The proprietary model of development, and the more unique differentiation employed by Apple and RIM seem to be working, giving these companies greater success in the market.

Additionally, BlackBerry smartphones have bucked the trend to limiting the phone to a specific service provider. Most of RIM’s phones can be purchased through any major U.S. service provider. Thus, no matter where a business is located, or what service provider it prefers, it can purchase almost any BlackBerry smartphone.

RIM also takes advantage of a number of other synergies to differentiate its product. It produces a number of very advanced software servers that integrate seamlessly with Microsoft enterprise software, to allow a business’s existing Microsoft-based computer infrastructure to easily communicate with BlackBerry devices. This provides potential consumers with a turn-key, robust solution for smartphone integration that other manufacturers have had a difficult time replicating.

C. HTC

HTC is an electronics manufacturer that focuses primarily on smartphones.\textsuperscript{160} HTC does not develop original operating systems for its phones, but rather makes use of either open source or licensable OS's. Although it previously developed and sold Windows Mobile smartphones, in 2009 began focusing almost exclusively on Android smartphones.\textsuperscript{161} (See Figure 13, Figure 14, and Figure 15 for three examples of currently popular HTC Android smartphones available on various networks.) This strategy has proven successful, as Android has become more and more popular.

\textsuperscript{158} http://us.blackberry.com/smartphones/blackberrycurve3G/#
\textsuperscript{159} http://us.blackberry.com/smartphones/blackberrytorch.jsp
\textsuperscript{160} http://en.wikipedia.org/wiki/HTC_Corporation.
\textsuperscript{161} Id.
among consumers. HTC recently introduced multiple smartphones based on Windows Phone 7 when it launched.¹⁶² (See Figure 16 for one of HTC’s Windows Phone 7 phones.)

Not having a proprietary OS like Apple and RIM makes differentiation more difficult. HTC differentiates its smartphones from those of other manufacturers by providing many different hardware configurations that will suit any smartphone customer.¹⁶³ Further, HTC heavily modifies Android on many of its smartphones, providing unique frontends, user interactions, and apps that a distinct from other Android smartphones (including improved email clients, etc.).¹⁶⁴

HTC also strives to be a market leader with new technology, beating other manufacturers to the market and thus having a window in which to sell smartphones that are state of the art. Examples of this strategy include selling the first Windows Mobile smartphone, the first Android smartphone, and the first touch screen smartphone.¹⁶⁵ HTC is trying to match this trend by selling more different models of Windows Phone 7 smartphones at launch than any other manufacturer.¹⁶⁶

Having room to differentiate due to a manufacturing model that is similar to Motorola, Samsung, and LG, HTC finds itself in a constant battle with these other manufacturers, vying to as much of the market as possible as it continues to rapidly grow. HTC’s smartphones are sold at prices that are in parity with other smartphone manufacturers, with the exception of Apple.

Figure 13: HTC HD2 (Android, available on T-Mobile).¹⁶⁷

Figure 14: HTC EVO 4G (Android, available on Sprint).¹⁶⁸

¹⁶⁴ See http://arstechnica.com/gadgets/reviews/2010/06/hands-on-ars-reviews-the-htc-evo-4g.ars.
¹⁶⁸
D. **Motorola, Samsung, LG**

Motorola, Samsung and LG all have similar strategy. All are extremely large multinational corporations that are in various segments of the electronics industry. All previously developed and sold feature-phones for many years, and all hold significant intellectual property in the telecommunications area. Today, all of them are invested in the smartphone market, mostly developing Android (and now Windows Phone 7) smartphones (see Figure 17, Figure 18, Figure 19 and Figure 20 for some examples of popular smartphones from each company), with varying degrees of success with each model. The profit margins on smartphones for these companies are

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much lower than for Apple and RIM, likely giving them less market power. These lower margins exist because these companies have a larger catalog of smartphones, many of which are sold for much cheaper prices than their competitors. Each has similar strategies for differentiating their smartphones from the other manufacturers: unique hardware, unique built-in apps, unique Android customizations, etc. Although the Android Marketplace already exists, Samsung recently opened its own app store for Android. Others are following, and more are likely to follow in the near future. This provides a unique characteristic to Samsung Android phone users, although it is arguable just whether it is an advantage or not for the consumer.

Figure 17: Motorola Droid X (Android, available on Verizon).

Figure 18: Samsung Galaxy S (Android, available on Sprint).

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175 This is similar to the strategy described for HTC.

176 http://www.samsungapps.com/about/aboutApps.as.


178 http://galaxys.samsungmobile.com/
E. HP/Palm

In July of 2010 Hewlett-Packard (HP) purchased Palm for $1.2 billion. Just a year prior to that acquisition Palm became exclusively a smartphone company, producing a unique new proprietary OS (webOS), running on unique smartphone hardware. By purchasing Palm, HP bought into the smartphone market with the hopes of making Palm’s phones, the Palm Pre (see Figure 21) and the Palm Pixi (see Figure 22) more successful that they have been.

Palm smartphones differentiate from the competition with a blend of stylish hardware and a unique proprietary OS. Some of the advantages of webOS were previously explained. webOS has very good integration with social networking and contacts syncing. The smaller than average form factor of the Palm smartphones also differentiated them from the competition. Palm has an app

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184 See the section on webOS above. See also id.
store, having mimicked the other smartphone manufacturers, but it is also very small. None of these characteristics has proven very successful though, as sales of Palm smartphones have been weak throughout their life.\textsuperscript{185} Apps available on other smartphone platforms have effectively enabled the same advantages that are available on Palm smartphones, cutting into much of the product differentiation that Palm enjoyed at launch.

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{figure21.png}
\caption{Palm Pre 2 (available on Verizon).\textsuperscript{186}}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.4\textwidth]{figure22.png}
\caption{Palm Pixi (available on Sprint).\textsuperscript{187}}
\end{figure}

\section{VI. Summary of Intermarket-level Effects}
Many of the intermarket effects have been discussed throughout this report. Multiple markets have an effect on the U.S. smartphone market: from the suppliers (audio chips, baseband & application processors, camera technology and subsystems, input technology, multimedia chipsets, wi-fi chips, plastic and mechanical parts, RF components, etc.), to the industrial designers, to the distributors, to the retailers (whether it is the manufacturers themselves, or the network service providers, or third-party retailers), to the network service providers.\textsuperscript{188}

\textsuperscript{186} http://www.palm.com/us/products/phones/pre2/index.html
\textsuperscript{187} http://www.palm.com/us/products/phones/pixi/index.html
\textsuperscript{188} VisionMobile, Mobile Industry Atlas, 3rd Edition.
Smartphone manufacturers make contracts with the network service providers for exclusivity of certain phones, and the providers in turn subsidize the cost of the smartphone for the consumer. Every smartphone user must purchase service with their smartphone, or the value of the smartphone is significantly diminished.

Operational synergies exist for firms that are vertically integrated, following the proprietary model. Apple is highly integrated, producing the software and hardware of its phones, as well as running the app store, and providing the content that is used on the device (music, movies and TV shows through iTunes), as well as integrating the device with other Apple hardware and software (computers, iTunes, Apple TV). This provides a significant operational synergy for Apple. Apps have complementary demand with smartphones, and provide an additional revenue stream for the manufacturer if it is the operator of the app store. The existence of a substantial app catalog also increases the value of the smartphone for the user as it gives the smartphone additional functionality.

VII. Conclusion

The U.S. smartphone market is rapidly changing, with constant product introductions, quickly evolving technology and designs, short product life cycles, aggressive pricing, rapid imitation of product and technological advancements, a highly price sensitive consumers. The U.S. smartphone market consists of all firms throughout the world that manufacture and sell smartphones to U.S. consumers. No one firm in the market has sufficient market share to control prices, resulting is strong rivalry and competitive pricing. The barriers to entry are high due to the existence of patents, high fixed costs and economies of scale, regulation, and brand loyalty. The individual market participants engage in attempts at product differentiation, some being more successful than others. Intermarket effects are also significant in the U.S. smartphone market. Multiple other markets have an effect on the U.S. smartphone market: from the suppliers, to the industrial designers, to the distributors, to the retailers, to the network service providers. Because of its rapid change, the U.S. smartphone market is likely to be significantly different in as short a time as 1-5 years.

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189 See the section on service providers above. See also http://www.foxbusiness.com/markets/2010/08/06/att-downplays-impact-advantage-phone-exclusivity-agreements/.
190 See the section above on Apple.
191 See the section on apps above for a further discussion.