Università
Ca'Foscari
Venezia

Corso di Laurea magistrale
in Economia e Gestione delle Aziende
Curriculum: International Management

Tesi di Laurea Magistrale

Ca' Foscari
Dorsoduro 3246
30123 Venezia

Why did Apple change its strategy?

The case of the iPhone: adoption of a new technology and trade-in programs in the context of innovation

Relatore
Ch. Prof. Marco Tolotti

Correlatore
Ch. Prof. Andrea Borghesan

Laureando
Silvia De Stefani
Matricola 821262

Anno Accademico
2013 / 2014

INDEX

INTRODUCTION....4

CHAPTER 1: DATA IN THE CONTEXT....5

PREFACE: THE EVOLUTION OF THE IPHONE....5

PART I: IPHONE SALES FIGURES....8

1.1: FISCAL YEAR 2007....8
1.2: FISCAL YEAR 2008....9
1.3: FISCAL YEAR 2009....10
1.4: FISCAL YEAR 2010....12
1.5: FISCAL YEAR 2011....13
1.6: FISCAL YEAR 2012....15
1.7: FISCAL YEAR 2013....16
1.8: FISCAL YEAR 2014....18

PART II: IPHONE MARKET SHARE....21

PART III: CUSTOMER SATISFACTION....23

3.1: NOVEMBER 2008....23
3.2: OCTOBER 2009.... 25
3.3: SEMPTEMBER 2010....26
3.4: MARCH 2011....27
3.5: MARCH 2012....28
3.6: SEPTEMBER 2012.... 29
3.7: MARCH 2013....30
3.8: OCTOBER 2014....31
3.9: A DECLINING SATISFACTION....33

CHAPTER 2: THE REASONS BEHIND IPHONE SUCCESS

PART I: FACTORS OF SUCCESS....37

1.1: A DIFFERENT PRODUCT.....37
1.2: A DISRUPTIVE INNOVATION.....38
1.3: A SUCCESSFUL BUSINESS MODEL..... .39
1.4: A WIN- WIN PARTNERSHIP.....40
1.5: A STRONG BRAND IMAGE AND A LOYAL CUSTOMER BASE..... 41
1.5.1: A CASE OF SOCIAL DEVOTION.....42

PART II: A SUCCESSFUL STRATEGY.....44

2.1: A STRATEGY SHIFT IN PRODUCT INNOVATION.....44
2.2: MARKET ENTRY AND COMPETITOR RESPONSE.....45
2.3: A CONSTRAINED DIVERSIFICATION.....48
2.4: THE INTEGRATION STRATEGY.....49
2.5: A WINNING PRICE STRATEGY.....49

PART III: THE DIFFUSION AND ADOPTION OF INNOVATION
A THE THEORETICAL BACKGROUND.....51

3.1: ROGERS' DIFFUSION OF INNOVATIONS.....51
3.2: MODELS OF DIFFUSION OF INNOVATIONS.....54
3.2.1: THE BASS MODEL.....54
3.2.2: THE NORTON-BASS MODEL.....55
3.2.3: THE GENERALIZED BASS MODEL.....56
3.2.4: A GENERALIZED NORTON-BASS MODEL.....57
3.3: AGENT-BASED MODELING IN THE CONTEXT OF INNOVATION.....58

CHAPTER 3: A CHANGE IN STRATEGY

PART I: REASONS BEHIND A LOSS.....62

1.1: A MATTER OF COMPETITION AND PRICE.....62
1.2: A MATTER OF INNOVATION.....64
1.3: A MATTER OF LEADERSHIP.....65

PART II: A NEW PRICING STRATEGY.....67

2.1: THE TRADE-IN PROGRAM.....68
2.2: HOW DID THE PROGRAM WORK?.....68

2.3: A PROFITABLE PROGRAM....69
2.4: MODELING A TRADE-IN PROGRAM....69
2.4.1: DEFINING THE DEMAND AND SUPPLY....70
2.4.2: SET UP AND RESULTS OF THE AGENT-BASED MODEL....72
2.4.3: DISCUSSION OF THE RESULTS....73

PART III: PLANNED OBSOLESCENCE....74

3.1: THE PROBLEM WITH iOS 7....74
3.2: THE CONSPIRACY THEORY....75
3.3: A MATTER OF TECHNICAL IMPROVEMENTS....77

CONCLUSIONS....78

REFERENCES....81

INTRODUCTION

In January 2007, Apple announced its forthcoming entry into the smartphone market with the release of a new product that would have completely reshaped the entire mobile phone industry: the iPhone. Presented as a revolutionary device able to act both as a phone and an entertainment platform, the launch that occurred in September 2007 was received by the public with an overwhelming enthusiasm. Since then, millions of iPhones have been sold, making it one of the most successful products ever released.

The objective of my study was to research and describe the factors that contributed to the success of the iPhone, providing evidence of such a huge consumer response by collecting figures on unit sales and revenues directly from Apple's quarterly and yearly reports on sales. After a brief overview on the iPhone models that Apple launched from 2007, the first chapter takes into considerations sales figures, market share figures and customer satisfaction measurements from 2007 to 2014, also comparing iPhone's performance in the smartphone industry to that of its main competitors. Increasing sales and market share are evidence of a success that has been maintained until the latest years, and high customer satisfaction indexes prove the great value that the Company has managed to reach with its fascinating and appealing product.

In the second chapter I tried to provide insights about the iPhone success, in particular deepening the strategic choices adopted by Apple to provide a different and more valuable product compared to the rivals' one. I focused my attention on the importance Apple has given to product innovation and technology advancement, taking also into consideration the strategy changes it employed in order to face competition in the smartphone market. From the product itself, to the pricing set by Apple, the Company's moves have proved to be favorable both for the revenues earned and for the brand image enhanced.

Although figures supported the success of the iPhone since its first days into the market, they also allowed me to discover a slight decrease in those high and sustained numbers starting from when the competition in the smartphone industry began to increase in its importance. Thus, in the third chapter I explain the reasons that led Apple to lose some market shares and customer satisfaction in the very last years. These were primarily linked to the increased competition coming from Android smartphones, which forced Apple to revise its strategy in order to foster adoption of its innovations and prevent existing users from switching to rivals' products. Moreover, I examined the strategy Apple adopted to face this situation, in particular the new pricing campaign it launched in 2013 in order to entice old technology users to switch to the new technology released. With the purpose to explain the rationale behind this new program, firstly I provide an overview of the main theories about diffusion of innovation and adoption of new technologies. This, later, helped me to introduce an agent-based model aimed at studying optimal pricing strategy and market shares' dynamics in the transition from an old to a new technology, thus deepening the rationality of an aggressive reduction in the price of upgrades.
In addition, the last part of the third chapter concerns with the critics that surrounded Apple when it released a new operating system that caused technical problems to the older devices, thus providing incentives to switch to the newest models.

I concluded giving an account of the main findings of the study conducted and providing some opinions about Apple's strategy for the forthcoming years.

CHAPTER 1: Data in the Context

PREFACE: THE EVOLUTION OF THE IPHONE

During the Macworld convention held in San Francisco on January 2007, Apple CEO Steve Jobs raised the curtain to a new device that Apple had been elaborating for nearly three years.
Presenting it as an iPod with a large display and touch controls, able to combine the features of a mobile phone and an Internet communicator, Jobs raised incredible amazement and expectation among the public by introducing the iPhone as the device that would "reinvent the phone".

> *"Today, we're introducing three revolutionary products. The first one is a widescreen iPod with touch controls. The second is a revolutionary mobile phone. And the third is a breakthrough Internet communications device. So, three things: a widescreen iPod with touch controls, a revolutionary mobile phone, and a breakthrough Internet communications device. An iPod, a phone, and an Internet communicator. An iPod, a phone...are you getting it? These are not three separate devices. This is one device. And we are calling it iPhone. Today, Apple is going to reinvent the phone."* - Steve Jobs, presentation of the iPhone, 9th January 2007 (Macworld Convention, San Francisco).

Jobs made fun of the smartphone offering existing at that time, which was composed of old-style mobile phones that could make calls, connect to the Internet and receive email but that was lacking some easiness of use and relied on QWERTY keyboards.

As a matter of fact, it was the year 2002 that, on the wave of an industry-wide move, began to sign the transition from the previous generation of mobile phones to the smartphones we are now used to think of. This passage from the old to the new category of phones occurred through the evolution of the Personal Digital Assistant, or PDA, a palmtop computer that functions as a personal information manager, with the ability to connect to the Internet, read and write e-mails, and typically provided with an appointment calendar, a to-do list, an address book for contacts, a calculator, and some sort of memo program (Schilling, 2010).
The new generation of smartphones combined Personal Digital Assistant characteristics into a wireless telephone. However, in contrast to some PDA models that presented wireless capabilities in the form of an awkward phone module, smartphones were distinguishing by enhancing the styling features of a mobile phone. For this reason they were more easy and practical to use as a telecommunications device. Moreover, whereas regular cell phones featured just some basic organizer capabilities and were able to show only a small subset of Web pages designed to fit the purpose of being readable on their small displays, smartphones were shaped in wider and larger screens that could easily display regular Web pages. They also typically enabled users to take pictures and download music or other data (Pegoraro, January 2002)
At the beginning, smartphones had higher margins than PDAs, but then with the convergence of PDAs and mobile phones companies producing PDAs, such as Palm and Compaq, were now forced to compete with very large and established mobile phones rivals such as Nokia, Motorola and Samsung. During the following years, Palm, Research in Motion, Nokia, Motorola, Samsung and HTC found themselves a more and more competitive scenario characterized by a fast growing smartphone market in which different generations of devices followed one another introducing each

time more features and capabilities and at the same time trying to reduce the price in order to gain customers and shares. In 2005, while PDA sales were almost falling to a stop, over 13 million smartphones had already been sold.
The scenario existing at that moment, however, was about to change. A huge event occurred in June 2007, when Apple made a great entry into the smartphone market with its iPhone. The iPhone was presented with a refined and elegant shape, a highly reactive touch screen to allow the interaction with an intuitive interface, enhanced by the possibility to easily download and play music and videos, features already made familiar by the iPod enormous success. The iPhone was considered a huge commercial and critical success, selling more than 1 million units in its first 74 days (Information Today 24, 2007). It was also locked into an exclusive arrangement with AT&T, making other carriers feel the urge to find touch screen-based phones with which to compete against the iPhone.

The iPhone is now considered to have reshaped the entire smartphone industry and helped Apple become one of the most valuable companies in the world.
Eight generations later, iPhone is starting to see declining market share in the face of less-expensive devices from competitors like Samsung, LG and Motorola (owned by Google), but the iPhone still remains the top-selling phone of all time in the U.S., Japan and other countries.

From the first launch to the latest releases, here a brief description of all the iPhone models is listed:

1. The iPhone (Date of Release: June 29, 2007)

The first iPhone featured quad-band GSM cellular connectivity, 3.5-inch screen (diagonally) and 320×480 pixel resolution. It was released in three versions concerning the storage memory: 4GB, 8GB and 16GB models. At launch price was very high: $499 for the 4GB and $599 for the 8GB model on-contract, but in September is was dropped to $399 for the 8 GB model, while discontinuing the 4 GB model.

2. iPhone 3G (Date of Release: July 11, 2008)

The second iPhone was called iPhone 3G because Apple introduced 3G connection and GPS. The new device came with the updated iOS 2.0, which added features like Push email, turn-by-turn navigation and most important the App store, the new distribution platform for third-party applications. Since according to Apple's research 56% of potential iPhone customers were reluctant to buy it in front of the high price, also impeding its ability to drive adoption of premium services, Apple tried and managed to convince carriers to subsidize the price, dropping it from $499/$599 on contract to a much affordable $199/$299.

3. iPhone 3GS (Date of Release: June 19, 2009)

The iPhone 3GS, where the S stood for “speed”, came with a faster processor and an improved 3 megapixel camera that could capture 480pixel videos. Apple also added support for voice controls and faster 7.2 Mbit/s downloading. The versions released where the 8, 16 and 32 GB and the price stayed the same, $99/$199/$299 on a 2 year contract.

4. iPhone 4 (Date of Release: June 24, 2010)

The iPhone 4 was introduced with a new revamped design with a plat surface on its back instead of the previous rounded shape and a stainless-steel frame. It was launched as the thinnest smartphone

in the world at the time and was the first to introduce the high-resolution “Retina display” and a front-facing camera for video calls. Apple also improved the camera to 5 megapixels and 720pixel for the videos. The iPhone 4 featured the new A4 system-on-chip and iOS 4 operating system version, providing the iPhone with multitasking functionality, such as Apple's new FaceTime video chat service. With this model, the locked agreement with AT&T as the exclusive carrier of iPhone products in the United States ended. Price once again stayed the same, $199 and $299 on contract.

5. iPhone 4S (Date of Release: October 14, 2011)

With the fifth generation, Apple upgraded the camera with 8 megapixels and 1080pixel for video capture. Apple also upgraded the hardware to a dual-core A5 processor and introduced Siri intelligent personal assistant, that is what the S stood for, even if after Steve Jobs Death most of the fans saw it as a homage his memory. The release of 4S came with the launch of iOS5 that allowed many features such as iCloud, iMessage, and integration with Twitter.
Pricing again stayed the same, $199 and $299 for the 16 and 32GB, with the new, larger capacity 64GB model at $399.

6. iPhone 5 (Date of Release: September 21, 2012)

The iPhone 5 featured a new dual-core A6 chip and a larger 4 inch display with 16:9 aspect ratio. Its design was shaped to be the thinnest and lightest among the previous model, with a new aluminum frame. The iPhone 5 was also the first iPhone to feature LTE support, a standard for wireless communication of high-speed data, and Lightning, a new compact dock connector which replaces the 30-pin design used by previous iPhone models. The price stayed the same, $199, $299, and $399 on contract.

7. iPhone 5C and iPhone 5S (Date of Release: September 20, 2013)

The seventh generation of the iPhone came in two different models. The iPhone 5C is mostly the same as the iPhone 5, but presents a new body made out of polycarbonate and developed by Apple itself, five different colors and a new backside-illuminated FaceTime camera.
The iPhone 5S is esthetically similar to the iPhone 5, but is provided with a new TouchID home button with fingerprint recognition technology. The camera was upgraded again with a larger aperture and dual-LED flash, and a new A7 dual-core processor was introduced, making the iPhone 5S the first smartphone with a 64-bit processor. Apple also added the M7 processor into the iPhone to handle motion data. The iPhone 5S retailed in the US for $199 on contract or $649 off-contract, the 5C retailed for $99 on contract or $549 off-contract.

8. iPhone 6 and iPhone 6 Plus (Date of Release: September 19, 2014)

The iPhone 6 and iPhone 6 Plus are the latest model released by Apple and came with several improvements such as a larger 4.7-inch and 5.5-inch screens, a powerful processor, enhanced camera's functionality, improved LTE and Wi-Fi connectivity.
The most important difference between them are the displays dimension, but both of them present a Retina HD display. The iPhone 6 and 6 Plus are the first iPhones to employ modified polarizer that makes the screen easier to see when wearing polarized sunglasses (Apple Official Website). They are run by the new A8 chip and a M8 processor which continuously processes data from the sensors (accelerometer, compass, gyroscope, barometer). Prices were set at $199 for 4.7-inch and $299 for 5.5-inch on contract.

PART I: IPHONE SALES FIGURES*

Recently Apple has been facing growing competition in the smartphone category, primarily from Samsung devices. Even if iPhone sales in absolute terms have been constantly growing during the years, the latest sign that Apple may be losing some of its cache with consumers is a small drop in customer satisfaction levels in the mobile phone category and a drop in global smartphone market share.
I begin showing the net sales and the unit sales of the iPhones starting from the first release and following fiscal years from 2007 to 2014.

(*All sales figures are taken from Apple 2007-2014 Reports, available at Apple's official Website).

1.1) FISCAL YEAR 2007

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 29, 2007. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2007).

	September 29, 2007	Change	September 30, 2006	Change	September 24, 2005
Net sales *	123	NM	-	NM	-
Total net sales	24.006	24,00%	19.315	39,00%	13.931
Unit sales	1.389	NM	-	NM	-

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.
NM: not meaningful

In January 2007, the Company announced the iPhone. During 2007 Apple's net sales increased 24% corresponding to $4.7 billion from the previous year even if, in terms of fiscal year, 2006 considered a period of 53 weeks while 2007 had just 52 weeks.
In 2007 iPhone unit sales touched 1.39 million and net sales of iPhone and related products and services were $123 million, comprising also the share of iPhone revenues earned from the subscription of 2-years contracts, the sales of iPhone accessory products and revenue from carrier agreements.

We also have the 2007 third and fourth quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q3 2007 Unaudited Summary Data

Q2 2007		Q3 2006		**Q3 2007**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
-	-	-	-	**270**	**5**	NM	NM	NM	NM

Q4 2007 Unaudited Summary Data

Q3 2007		Q4 2006		**Q4 2007**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
270	5	-	-	**1.119**	**118**	NM	NM	NM	NM

NM: Not meaningful

1.2) FISCAL YEAR 2008

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 27, 2008. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2008).

	2008	Change	2007	Change	2006
Net sales *	1.844	NM	123	NM	-
Total net sales	32.479	35%	24.006	24%	19.315
Unit sales	11.627	NM	1.389	NM	-

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.
NM: not meaningful

The second iPhone model was announced in June 2008. During that year Apple's net sales increased 35% and $8.5 billion compared to the previous year.
In 2008 unit sales of iPhone amounted to 11.6 million, while net sales of iPhone and related products and services were $1.8 billion. That year sales of the iPhone showed a growth thanks to the expansion outside the U.S., with Apple confident to reach over 70 countries with its devices by the end of the year. In 2007 iPhone and related products and services had reached $123 million of net sales for one fiscal quarter. iPhone net sales comprised also the share of iPhone revenues earned from the subscription of 2-years contracts, the sales of iPhone accessory products and revenue from carrier agreements.

We also have the 2008 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2008 Unaudited Summary Data

Q4 2007		Q1 2007		**Q1 2008**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
1.119	118	-	-	**2.315**	**241**	107%	104%	NM	NM

Q2 2008 Unaudited Summary Data

Q1 2008		Q2 2007		**Q2 2008**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
2.315	241	-	-	**1.703**	**378**	-26%	57%	NM	NM

Q3 2008 Unaudited Summary Data

Q2 2008		Q3 2007		**Q3 2008**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
1.703	378	270	5	**717**	**419**	-58%	11%	166%	NM

Q4 2008 Unaudited Summary Data*

Q3 2008		Q4 2007		**Q4 2008**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
717	419	1.119	118	**6.892**	**806**	861%	92%	516%	583%

* “Apple just reported one of the best quarters in its history, with a spectacular performance by the iPhone—we sold more phones than RIM,” said Steve Jobs, Apple’s CEO.

In July 2008, Apple launched the new iPhone 3G and established relationship with carriers outside the U.S., thus managing to distribute iPhones in more that 70 countries.
Unit sales of iPhone 3G largely outdid the sales of the first model, with 6.9 million units sold just in the first quarter from its launch to the end of September 2008, while unit sales for the original iPhone were 6.1 million in the prior five quarters combined. As a result of this growth in unit sales, the amount of iPhone revenue and product cost that the Company deferred for recognition in future periods under subscription accounting had a huge increase in the quarter ended September 27, 2008.

1.3) FISCAL YEAR 2009

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 26, 2009. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2009).

	2009	Change	2008	Change	2007
Net sales *	6.754	266%	1.844	NM	123
Total net sales	36.537	12%	32.479	35%	24.006
Unit sales	20.731	78%	11.627	NM	1.389

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.
NM: not meaningful

The new iPhone 3GS were presented in June 2009 and that year the Company net sales increased $4.1 billion and 12% from 2008.
In 2009 iPhone revenue and net sales of related products and services had an increment of $4.9 billion or 266% from 2008, reaching $6.8 billion of net sales and selling 20.7 million units during the same year. From the previous year, unit sales in 2009 had a raise of 9.1 million corresponding to 78%, in particular as a consequence of the broadening in the shipping and the sustained demand for the devices. The launch of the new generation model in the U.S. came in June, 2009 and in several other countries during the following months of that year. Revenue figures comprised also the share of iPhone revenues earned from the subscription of 2-years contracts, the sales of iPhone accessory products and revenue from carrier agreements.

We also have the 2009 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2009 Unaudited Summary Data*

Q4 2008		Q1 2008		**Q1 2009**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
6.892	806	2.315	241	**4.363**	**1.247**	-37%	55%	88%	417%

*Unit sales of iPhone 3G continued to be significant in the quarter ended December 27, 2008, with 4.4 million iPhones sold.

Q2 2009 Unaudited Summary Data

Q1 2009		Q2 2008		**Q2 2009**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
4.363	1.247	1.703	378	**3.793**	**1.521**	-13%	22%	123%	302%

Q3 2009 Unaudited Summary Data*

Q2 2009		Q3 2008		**Q3 2009**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
3.793	1.521	717	419	**5.208**	**1.689**	37%	11%	626%	303%

*In June 2009, the Company began selling iPhone 3GS, the third-generation iPhone. Unit sales of iPhones continued to be significant in the quarter ended June 27, 2009, with 5.2 million iPhones sold.

Q4 2009 Unaudited Summary Data

Q3 2009		Q4 2008		**Q4 2009**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
5.208	1.689	6.892	806	**7.367**	**2.297**	41%	36%	7%	185%

1.4) FISCAL YEAR 2010

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 25, 2010. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2010).

	2010	Change	2009	Change	2008
Net sales *	25.179	93%	13.033	93%	6.742
Total net sales	65.225	52%	42.905	14%	37.491
Unit sales	39.989	93%	20.731	78%	11.627

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.

The iPhone 4, the fourth-generation iPhone, was introduced by Apple in June 2010. During that year the Company's net sales increased $22.3 billion and 52% compared to 2009.
In 2010 net sales of iPhone and related products and services accounted for 39% of Apple's total net sales, with $25.2 billion of net sales and an increase of $12.1 billion, corresponding to a 93% increase from 2009. In 2010, sales of the iPhone reached 40 million in units, with an increment of 19.3 million and 93% from the previous year. This growth in iPhone sales was in particular a consequence of the continuous growth from existing carriers, the enlargement of the distribution with the inclusion of new international carriers and resellers, and also the huge demand for the new iPhone 4. The model was launched in the U.S. in June 2010 and in many other countries during the rest of 2010. The availability of the iPhone, until September 25, 2010, touched a number of 89 countries, where they were sold through 166 carriers.

We also have the 2010 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2010 Unaudited Summary Data

Q4 2009		Q1 2009		**Q1 2010**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
7.367	4.606	4.363	2.940	**8.737**	**5.578**	19%	21%	100%	90%

Q2 2010 Unaudited Summary Data

Q1 2010		Q2 2009		**Q2 2010**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
8.737	5.578	3.793	2.427	**8.752**	**5.445**	0%	-2%	131%	124%

Q3 2010 Unaudited Summary Data*

Q2 2010		Q3 2009		**Q3 2010**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
8.752	5.445	5.208	3.060	**8.398**	**5.334**	-4%	-2%	61%	74%

*"It was a phenomenal quarter that exceeded our expectations all around, including the most successful product launch in Apple's history with iPhone 4," said Steve Jobs, Apple's CEO.

Q4 2010 Unaudited Summary Data*

Q3 2010		Q4 2009		**Q4 2010**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
8.398	5.334	7.367	4.606	**14.102**	**8.822**	68%	65%	98%	92%

*iPhone sales of 14.1 million were up 91 percent year-over-year, handily beating the 12.1 million phones RIM sold in their most recent quarter.

1.5) FISCAL YEAR 2011

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 24, 2011. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2011).

	2011	Change	2010	Change	2009
Net sales *	47.057	87%	25.179	93%	13.033
Total net sales	108.249	66%	65.225	52%	42.905
Unit sales	72.293	81%	39.989	93%	20.731

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.

Apple launched the new iPhone 4S, the fifth-generation iPhone, in October 2011. In that year the Company's net sales increased $43.0 billion and 66% compared to 2010.
Net sales of iPhone and related products and services accounted for 43% of Apple's total net sales

for 2011. Sales had a raise of $21.9 billion and 87% compared to the previous year, reaching $47.1 billion of net sales and representing a total of 72.3 million unit sales that year. In 2011, unit sales had a positive variation of 32.3 million and 81% in relation to the previous year.
The sustained growth in iPhone net sales was a consequence of the sustained demand for iPhone 4 in all of Apple's foreign markets. In particular the growth was boosted by the U.S. broadening of the shipping of the devices to the Verizon Wireless network, that started in February 2011, by the continuous expansion into new countries and the increased distribution with other new carriers and resellers, allowing the iPhone to be sold in 105 countries through 228 carriers by September 24, 2011, in addition to the Company's own direct channels.

We also have the 2011 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2011 Unaudited Summary Data

Q4 2010		Q1 2010		**Q1 2011**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
14.102	8.822	8.737	5.578	**16.235**	**10.468**	15%	19%	86%	88%

Q2 2011 Unaudited Summary Data

Q1 2011		Q2 2010		**Q2 2011**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
16.235	10.468	8.752	5.445	**16.647**	**12.298**	15%	17%	113%	126%

Q3 2011 Unaudited Summary Data

Q2 2011		Q3 2010		**Q3 2011**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
18.647	12.298	8.398	5.334	**20.338**	**13.311**	9%	8%	142%	150%

Q4 2011 Unaudited Summary Data

Q3 2011		Q4 2010		**Q4 2011**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
20.338	13.311	14.102	8.822	**17.073**	**10.980**	-16%	-18%	21%	24%

1.6) FISCAL YEAR 2012

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 29, 2012. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2012).

	2012	Change	2011	Change	2010
Net sales *	80.477	71%	47.057	87%	25.179
Total net sales	156.508	45%	108.249	66%	65.225
Unit sales	125.046	73%	72.293	81%	39.989

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.

In October 2011 and September 2012 Apple introduced iPhone 4S and iPhone 5, respectively, thus giving birth to its fifth and sixth generation of the iPhone. During 2012, the Company's net sales increased $48.3 billion and 45% from the year before.
In 2012 net sales for the iPhone and related products and services showed an increment of $33.4 billion and 71% in relation to the previous year, amounting to $80.5 billion, while iPhone unit sales reached 125 million that year, representing an increase of 52.8 million units and 73% compared to the previous year.
The sustained growth in iPhone net sales and unit sales during 2012 was a consequence of the huge demand for iPhone in all of the Apple's markets, in particular thanks to the launch of iPhone 4S in the first quarter of 2012 and iPhone 5 in the fourth quarter of 2012, the continuous demand for iPhone 4 and iPhone 3GS, and the broadening of the shipping and sales through new carriers and resellers. Net sales of iPhone and related products and services were 51% and 43% of the Company's total net sales for 2012 and 2011, respectively. The increase in net sales was huge during the first half of 2012, as a consequence of the launch of iPhone 4S in the first quarter of 2012 and Apple's ability to satisfy customers demand more rapidly for the iPhone 4S in comparison to that of the iPhone 4.

We also have the 2012 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2012 Unaudited Summary Data*

Q4 2011		Q1 2011		**Q1 2012**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
17.073	10.980	16.235	10.468	**37.044**	**24.417**	117%	122%	128%	133%

*In October 2011, the Company launched iPhone 4S

Q2 2012 Unaudited Summary Data

Q1 2012		Q2 2011		**Q2 2012**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
37.044	24.417	18.647	12.298	**35.064**	**22.690**	-5%	-7%	88%	85%

Q3 2012 Unaudited Summary Data

Q2 2012		Q3 2011		**Q3 2012**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
35.064	22.690	20.338	13.311	**26.028**	**16.245**	-26%	-28%	28%	22%

Q4 2012 Unaudited Summary Data*

Q3 2012		Q4 2011		**Q4 2012**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
26.028	16.245	17.073	10.980	**26.910**	**17.125**	3%	5%	58%	56%

*In September 2012, the Company launched iPhone 5

1.7) Fiscal year 2013

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 28, 2013. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2013).

	2013	Change	2012	Change	2011
Net sales *	91.279	16%	78.692	71%	45.998
Total net sales	170.910	9%	156.508	45%	108.249
Unit sales	150.257	20%	125.046	73%	72.293

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.

IPhone 5 was released in September 2012 and one year later, in September 2013, Apple launched also the iPhone 5c and iPhone 5s, while at the same time releasing the new iOS7. As a consequence, the Company saw its net sales rising 9% and $14.4 billion during 2013 compared to the previous year.
IPhone net sales reached $91.2 million, an increase of 16% compared to 2012 and unit sales totaled 150.2 million with a positive variation of 20% from the year before.

This strong increase in net sales and unit sales during 2013 was a consequence of the growing demand for iPhone in all of Apple's markets, made possible by the release of iPhone 5 started in September 2012, the huge sustained demand for iPhone 4 and 4s and the launch of iPhone 5c and 5s.
The influence of the increase in iPhone unit sales in 2013 was in part neutralized by a 3% reduction in iPhone average selling prices occurred that year, that touched all of Apple's markets. This happened in particular as the consequence of a change in product mix towards lower-priced iPhone models, especially the iPhone 4.

We also have the 2013 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2013 Unaudited Summary Data*

Q4 2012		Q1 2012		**Q1 2013**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
26.910	16.645	37.044	23.950	**47.789**	**30.660**	78%	84%	29%	28%

*In September 2012, Apple launched iPhone 5

Q2 2013 Unaudited Summary Data

Q1 2013		Q2 2012		**Q2 2013**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
47.789	30.660	35.064	22.276	**37.430**	**22.955**	-22%	-25%	7%	3%

Q3 2013 Unaudited Summary Data

Q2 2013		Q3 2012		**Q3 2013**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
37.430	22.955	26.028	15.821	**31.241**	**18.154**	-17%	-21%	20%	15%

Q4 2013 Unaudited Summary Data*

Q3 2013		Q4 2012		**Q4 2013**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
31.241	18.154	26.910	16.645	**33.797**	**19.510**	8%	7%	26%	17%

*In September 2013, the Company launched iPhone 5c and 5s and the new iOS7

1.8) Fiscal year 2014

The following table summarizes net sales and unit sales of iPhone during the three fiscal years ended September 27, 2014. Net sales are in million dollars and unit sales are in thousands (Apple Annual Report, 2014).

	2014	Change	2013	Change	2012
Net sales *	102.991	12%	91.279	16%	78.692
Total net sales	182.795	7%	170.910	9%	156.508
Unit sales	169.219	13%	150.257	20%	125.056

*Net sales of iPhone and related products and services. Derived from handset sales, carrier agreements, and Apple-branded and third-party iPhone accessories.

In September 2014, the Apple launched its last generation iPhone, the iPhone 6 and iPhone 6 Plus. During 2014, the Company's net sales increased 7% and $11.9 billion from the previous year.
IPhone net sales and unit sales increased during 2014, the first one reached $103 million with a change of 12% compared to 2013; the second totaled 169.2 million units reflecting an increase of 13% from the year before.
Growth in net sales and unit sales was a reflection of the success reached by the release of iPhone 5S and iPhone 5C in the second part of the year 2013, by the success reached by the release of the iPhone 6 and iPhone 6 Plus that started in September 2014, and by the further broadening of shipping.
iPhone unit sales grew in all of the Company's market, while iPhone net sales grew in all segments except from Pacific Asia. Overall average selling prices for iPhone did not face much variation in 2014, differently from what happened the year before, while the increase in them in the Americas and in the Retail segments have been almost neutralized by a reduction in prices in Asia.

We also have the 2014 quarter results and their variation in terms of revenue and unit sales for the iPhone and related product and services (including Apple-branded and third-party iPhone accessories). Revenues are in million dollars and unit sales in thousands.

Q1 2014 Unaudited Summary Data*

Q4 2013		Q1 2013		**Q1 2014**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
33.797	19.510	47.789	30.660	**51.025**	**32.498**	51%	67%	7%	6%

*In September 2013, the Company launched iPhone 5c and 5s and the new iOS7

Q2 2014 Unaudited Summary Data

Q1 2014		Q2 2013		**Q2 2014**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
52.025	32.498	37.430	22.955	**43.719**	**26.064**	-14%	-20%	17%	14%

Q3 2014 Unaudited Summary Data

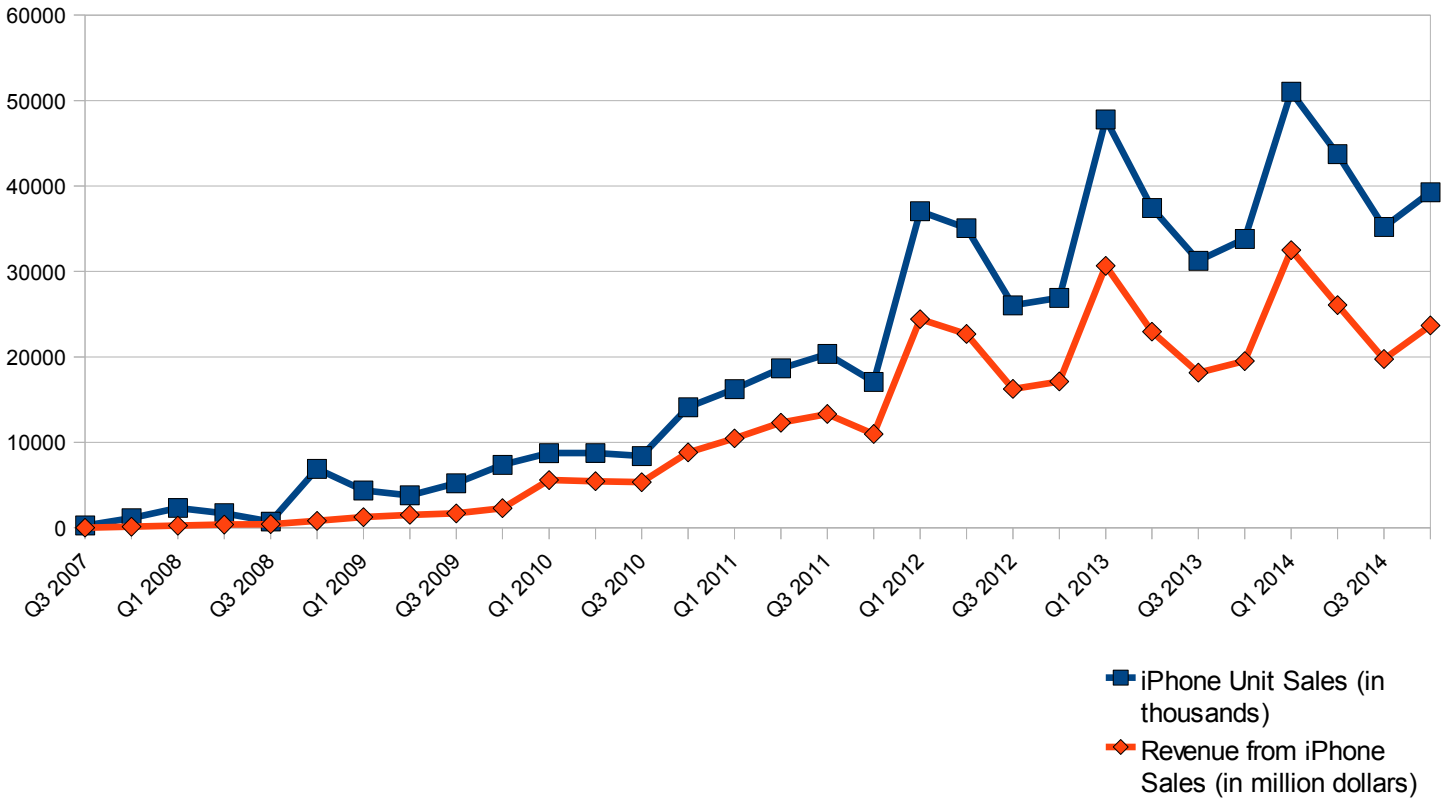
Q2 2014		Q3 2013		**Q3 2014**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
43.719	26.064	31.241	18.154	**35.203**	**19.751**	-19%	-24%	13%	9%

Q4 2014 Unaudited Summary Data*

Q3 2014		Q4 2013		**Q4 2014**		Sequential Change		Year/Year change	
Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue
35.203	19.751	33.797	19.510	**39.272**	**23.678**	12%	20%	16%	21%

*"Our fiscal 2014 was one for the record books, including the biggest iPhone launch ever with iPhone 6 and iPhone 6 Plus (September 2014)"- said Tim Cook, Apple's CEO

Quarterly Unit Sales and Net Sales of iPhone since 2007



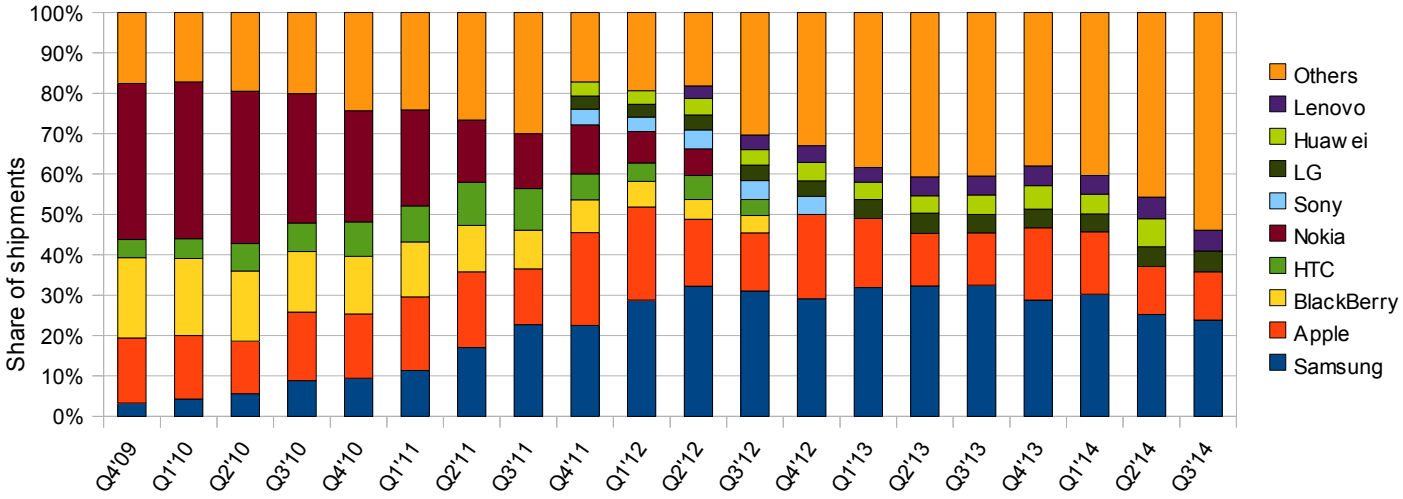
The graph above shows a constant growth of iPhone sales since its first launch in 2007. In particular, we can see that net sales suffer a drop during the periods preceding the launch of the new iPhones, while on the other hand they have a strong peak just after the introduction of the new models. The maximum peak in sales is related to the first quarter of 2014, which, in terms of fiscal year, corresponds to the last months of 2013, exactly the period after the launch of iPhone 5c and 5s.

PART II: IPHONE MARKET SHARE

Even if iPhone sales in absolute terms are growing during the years, Apple is starting to lose market share in the sales of the devices, whose market is maturing.
Even if smartphones does not yet represent a mature industry, its growth rates are gradually decreasing. Strategy Analytics' figures published on July 30, 2014 showed that global smartphone shipments totaled 295 million units in the second quarter of 2014, an increase of 27% from the year before. Gartner, a leading information technology research and advisory company, reported in an article published on February 2014 that the impact of smartphones was the 53.6% of the total mobile phone sales in 2013, thus surpassing outdoing the annual percentage of sales of standard mobile phones. According to Gartner's report, global unit sales of smartphones amounted to 968 million units during 2013, showing an increment of 42.3% from the previous year, that had totaled 680 million units sold.

Moreover, Gartner's report revealed that in 2013 Samsung outdid its rivals resulting the number one vendor, selling almost 300 million smartphones that year, with the Company's sales accounting for 32.3% of the market share. Samsung sales have increased from 2012, when it sold nearly 206 million smartphones and captured 30.3% of the market share. Even though Apple had sold more iPhones in 2013 compared to 2012's figures, the Company faced a drop in its market share: it totaled 151 million iPhone sold during 2013, while the year before sales amounted to 130 million units, with a drop from 19% to 15.2% market share.

Global market share held by leading smartphone vendors from Q4 2009 to Q3 2014*



	Q4'09	Q1'10	Q2'10	Q3'10	Q4'10	Q1'11	Q2'11	Q3'11	Q4'11	Q1'12
Samsung	3,30%	4,30%	5,60%	8,80%	9,40%	11,30%	17,00%	22,70%	22,50%	28,80%
Apple	16,10%	15,70%	13,00%	17,00%	15,90%	18,30%	18,80%	13,80%	23,00%	23,00%
BlackBerry	19,90%	19,10%	17,40%	15,00%	14,30%	13,60%	11,50%	9,60%	8,10%	6,40%
HTC	4,50%	4,90%	6,80%	7,10%	8,50%	8,90%	10,70%	10,30%	6,40%	4,50%
Nokia	38,60%	38,80%	37,70%	32,00%	27,60%	23,80%	15,40%	13,60%	12,20%	7,80%
Sony									3,90%	3,60%
LG									3,20%	3,20%
Huawei									3,50%	3,30%
Lenovo										
Others	17,60%	17,20%	19,50%	20,10%	24,30%	24,10%	26,60%	30,00%	17,20%	19,40%

	Q2'12	Q3'12	Q4'12	Q1'13	Q2'13	Q3'13	Q4'13	Q1'14	Q2'14	Q3'14
Samsung	32,20%	31,00%	29,10%	31,90%	32,30%	32,50%	28,80%	30,20%	25,20%	23,80%
Apple	16,60%	14,40%	20,90%	17,10%	13,00%	12,90%	17,90%	15,50%	11,90%	12,00%
BlackBerry	4,90%	4,30%								
HTC	5,90%	4,00%								
Nokia	6,60%									
Sony	4,70%	4,70%	4,50%							
LG	3,70%	3,80%	3,80%	4,70%	5,00%	4,60%	4,60%	4,40%	4,90%	5,10%
Huawei	4,10%	3,80%	4,60%	4,30%	4,30%	4,80%	5,80%	4,90%	6,90%	
Lenovo	3,10%	3,70%	4,10%	3,60%	4,70%	4,70%	4,90%	4,60%	5,40%	5,20%
Others	18,20%	30,30%	33,00%	38,40%	40,70%	40,50%	38,00%	40,40%	45,70%	53,90%

*Source: IDC Worldwide Quarterly Mobile Phone Tracker, 2014

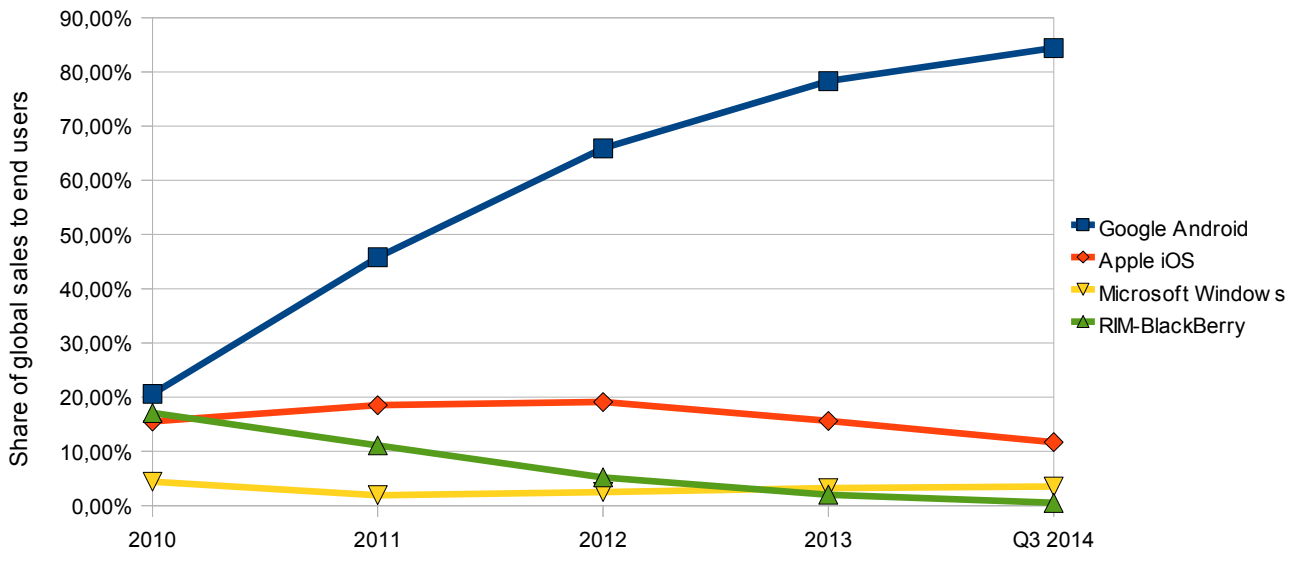
According to IDC's statistics for what concern the year 2014, Samsung remained the global leader in smartphone sales. In the third quarter of 2014, the Company captured a 23.8% share of smartphone shipments, beating the competition of its first rival, Apple, that reached just 12% of market share. Samsung's global market share peaked at 32.5% in 2013, but since then it has diminished, in particular as a result of the emergence of brands such as Lenovo and Huawei (IDC Worldwide Quarterly Mobile Phone Tracker, 2014).
However there has been an inversion in the trend during the very last months of 2014, after the launch and the immediately strong success of the launch of iPhone 6 and iPhone 6 Plus, that helped Apple to increase a bit its market share.

For what concern the operating systems, in 2012 Google Android captured a 65,9% market share, in 2013 reached a 78,3%, while Apple iOS fell from 19,1% of 2012 to 15,6% of 2013. Similarly in 2014 Google Android reached a new record of 84,4% share in the third quarter, at the expense of BlackBerry (0,5%), Apple iOS (11,7%), and Microsoft Windows Phone (3,5%). Although iPhone shipments increased from 33.8 to 39.3 million units, Apple's market share continued to drop (IDC Smartphone OS Market Share, 2014).

Global market share held by the leading smartphone OS (sales to end users)*

	2010	2011	2012	2013	Q3 2014
Google Android	20,60%	45,80%	65,90%	78,30%	84,40%
Apple iOS	15,50%	18,50%	19,10%	15,60%	11,70%
Microsoft Windows	4,40%	1,90%	2,50%	3,20%	3,50%
RIM-BlackBerry	17,10%	11,10%	5,20%	2,00%	0,50%

*Source: IDC Smartphone OS Market Share, 2014



PART III: CUSTOMER SATISFACTION

Since its first release, the iPhone has always performed first as the highest in consumer satisfaction for smartphones, beating the until then-stabilized competition of the major mobile phone producers (RIM-Blackberry, Palm-Treo, Samsung and Motorola). However, the very last years show iPhone losing ground in terms of customer satisfaction levels, with Samsung devices beating the Apple's ones for the first time in 2014.
I examined the customer satisfaction index published by J.D. Power and Associates, an important American firm conducting marketing researches, from 2008 to 2014.

3.1) NOVEMBER 2008

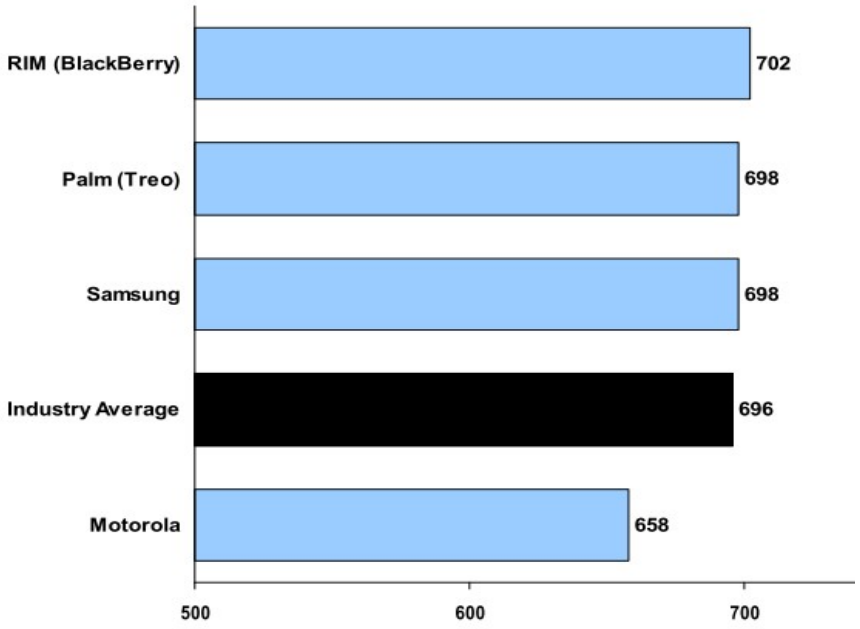
According to the J.D. Power and Associates 2008 Business Wireless Smartphone Customer Satisfaction Study, Apple ranked the highest with its iPhone in overall customer satisfaction among business wireless smartphone users. This study was based on responses from 1,388 business wireless customers who own a smartphone device and it was fielded between August and September 2008.
The study measures business customer satisfaction with wireless smartphones, which are represented by mobile phones that offers advanced capabilities and personal computer-like features. Overall satisfaction is measured across five key factors, which are, in order of importance: ease of operation (27%); operating system (24%); physical design (21%); handset features (18%); and battery aspects (10%).
Apple was the first in the ranking scoring 778 on a 1,000-point scale and performing particularly well in the ease of operation, physical design and handset feature factors. Apple is here followed by BlackBerry manufacturer RIM (703) and Samsung (701).

The senior director of wireless services for J.D. Power and Associates, Kirk Parsons said that "w*ith the introduction of the iPhone in 2007, Apple has clearly differentiated itself from the competition in areas that are most important to business smartphone users,*", and added that "*By making basic applications and features easy to use and providing functionality in a thin, lightweight device, Apple has performed well in exceeding customer expectations*." (Kirk Parsons, J.D. Power and Associates' Press Release, November 2008)

The study also found that average reported purchase price of a smartphone device was $216 in 2008, compared with an average reported purchase price of $261 in 2007. Apple owners report the highest device pricing at $337, while Motorola owners report the lowest pricing at $169.

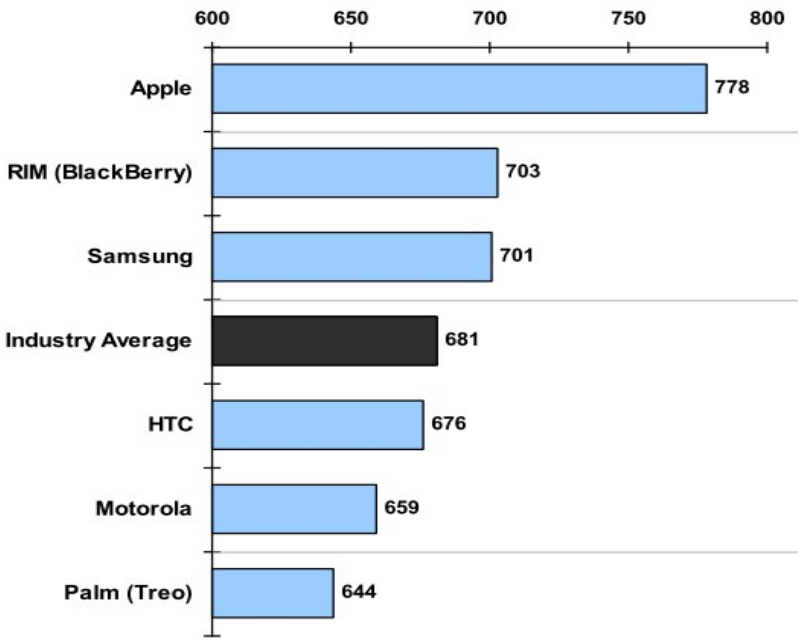
In the previous year study, J.D. Power and Associates 2007 Business Wireless Smartphone Customer Satisfaction Study, Apple was not present, of course, because the launch of the first iPhone came later. The first in the ranking, thus, was BlackBerry with 702 points, followed by Palm and Samsung.

J.D. Power and Associates 2007
Business Wireless Smartphone Customer Satisfaction Study:
Overall Smartphone Index Rankings
(Based on a 1,000-point scale)



Source: J.D. Power and Associates 2007 Business Wireless Smartphone Customer Satisfaction Study

J.D. Power and Associates 2008
Business Wireless Smartphone Customer Satisfaction Study:
Overall Smartphone Index Rankings
(Based on a 1,000-point scale)

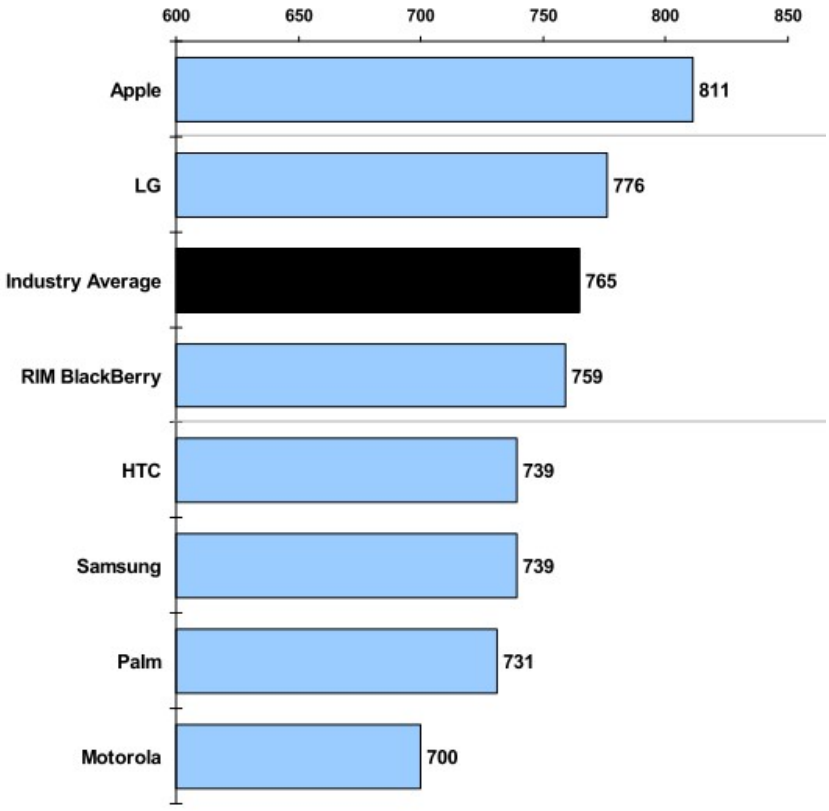


Source: J.D. Power and Associates 2008 Business Wireless Smartphone Customer Satisfaction Study

3.2) OCTOBER 2009

According to the J.D. Power and Associates 2009 Wireless Consumer Smartphone Satisfaction Study—Volume 2, Apple occupied again the top position among smartphones producers, scoring 811 points, especially for what concern the iPhone performance in the ease of operation, operating system, features and physical design. The following positions were occupied by LG (776) and RIM BlackBerry (759).
The study measures customer satisfaction with smartphones considering some important aspects, which are, in order of importance: ease of operation (30%); operating system (22%); features (21%); physical design (18%); and battery function (9%).
.
The 2009 Wireless Consumer Smartphone Satisfaction Study—Volume 2 is based on the collection of 3,221 customers' evaluations on smartphones used by them for less than two years and was conducted between January and June 2009.

The J.D. Power and Associates 2009
Wireless Consumer Smartphone Satisfaction Study—Volume 2
Overall Wireless Consumer Smartphone Index Rankings
(Based on a 1,000-point scale)



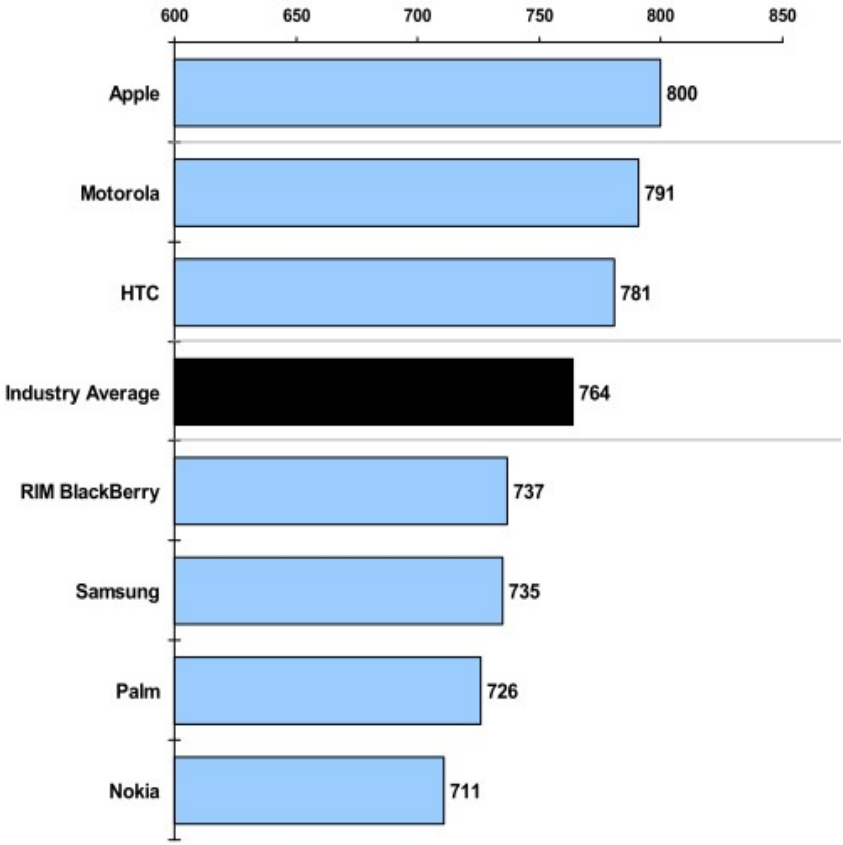
Source: J.D. Power and Associates 2009 Wireless Consumer Smartphone Satisfaction Study—Volume 2

3.3) SEPTEMBER 2010

According to the J.D. Power and Associates 2010 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 2, Apple occupied again the top position in customer satisfaction among smartphones producers, receiving 800 points on 1.000, and showing good performances in ease of operation, operating system, features and physical design. The second and third positions in the rankings are occupied by Motorola (791) and HTC (781), respectively.
The study measures customer satisfaction with smartphones across several key factors among users who have owned their current mobile phone for less than two years. The key factors of overall satisfaction with smartphones are, in order of importance: ease of operation (26%); operating system (24%); physical design (23%); features (19%); and battery function (8%).

The 2010 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 2 is based on the collection of 6,821 customers' evaluations on smartphones and was conducted between January and June 2010.

The J.D. Power and Associates 2010
Wireless Smartphone Satisfaction Study—Volume 2
Overall Wireless Smartphone Index Rankings
(Based on a 1,000-point scale)



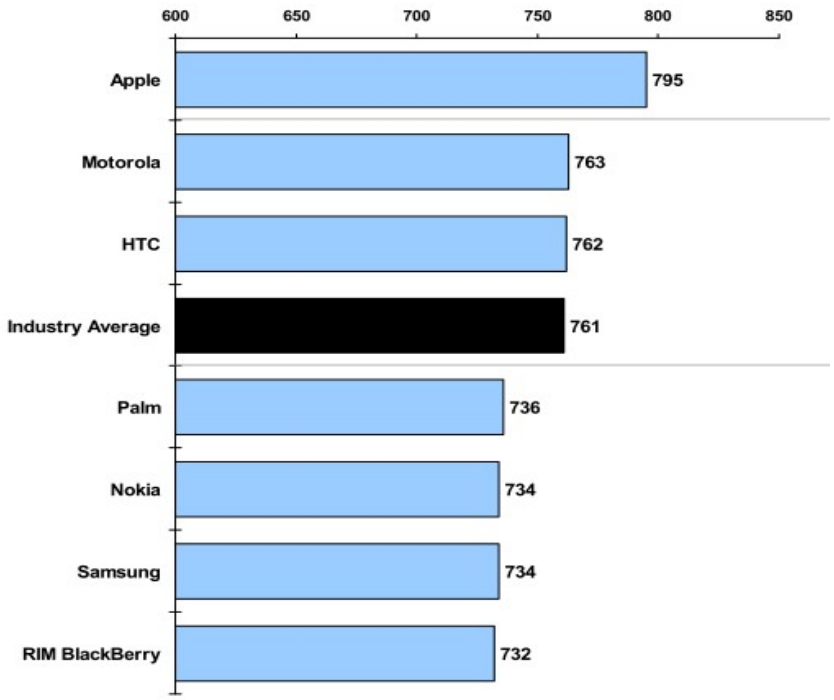
Source: J.D. Power and Associates 2010 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 2

3.4) MARCH 2011

According to the J.D. Power and Associates 2011 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 1, Apple occupied again the top position in customer satisfaction among smartphones producers, receiving 795 points on 1.000 and showing good performances in all categories, especially in ease of operation, operating system, features and physical design. The second and third positions in the smartphones rankings by Motorola (763) and HTC (762), respectively.
The study measures customer satisfaction with smartphones among owners who have used their current mobile phone for less than two years. The key factors of overall satisfaction with smartphones that are taken into consideration for the study are, in order of importance: ease of operation (26%); operating system (24%); physical design (23%); features (19%); and battery function (8%).

The 2011 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 1 is based on the collection of 7,275 customers' evaluations on smartphones and was conducted between July and December 2010.

The J.D. Power and Associates 2011
Wireless Smartphone Satisfaction Study—Volume 1
Overall Wireless Smartphone Index Rankings
(Based on a 1,000-point scale)



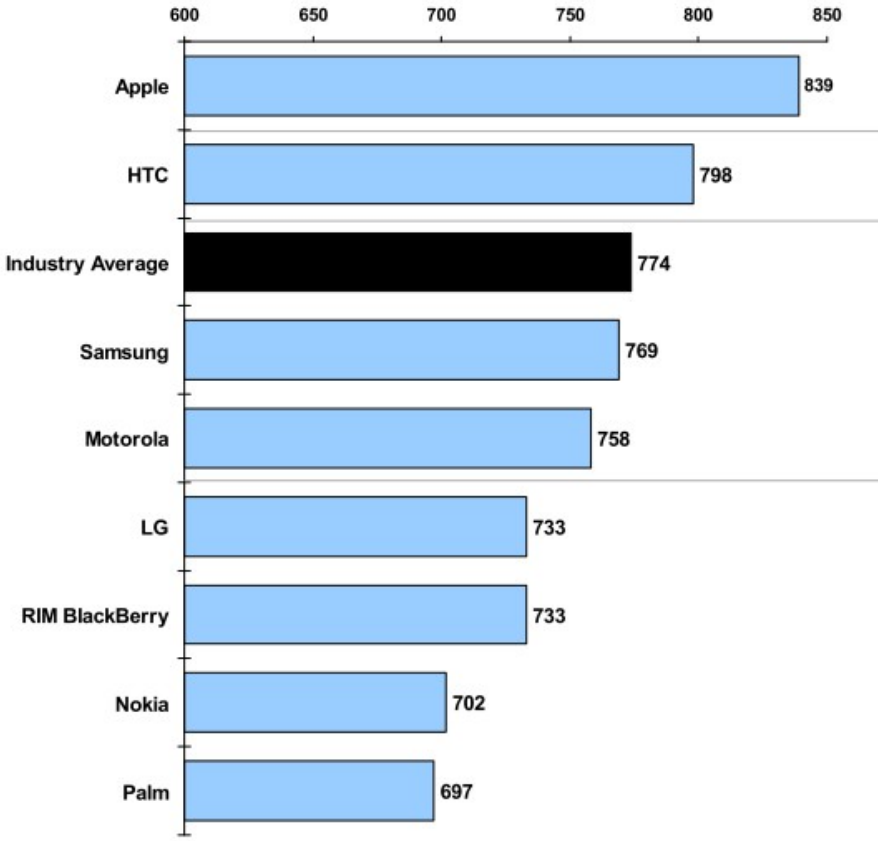
Source: J.D. Power and Associates 2011 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 1

3.5) MARCH 2012

According to the J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study —Volume 1, Apple occupied again the top position in customer satisfaction among smartphones producers, receiving 839 points on 1,000 and showing good performances in all categories, especially in the ease of operation and features. The second position in the smartphones rankings is occupied by HTC with 798 point.
The study measures customer satisfaction with smartphones among users who have owned their current mobile phone from less than one year. The key factors of overall satisfaction with smartphones that are taken into consideration for the study are, in order of importance: performance (35%); ease of operation (24%); features (21%); and physical design (20%).

The 2012 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 1 is based on the collection of 7,080 customers' evaluations on smartphones and was conducted between July and December 2011.

The J.D. Power and Associates 2012
Wireless Smartphone Satisfaction Study—Volume 1
Overall Wireless Smartphone Index Rankings
(Based on a 1,000-point scale)



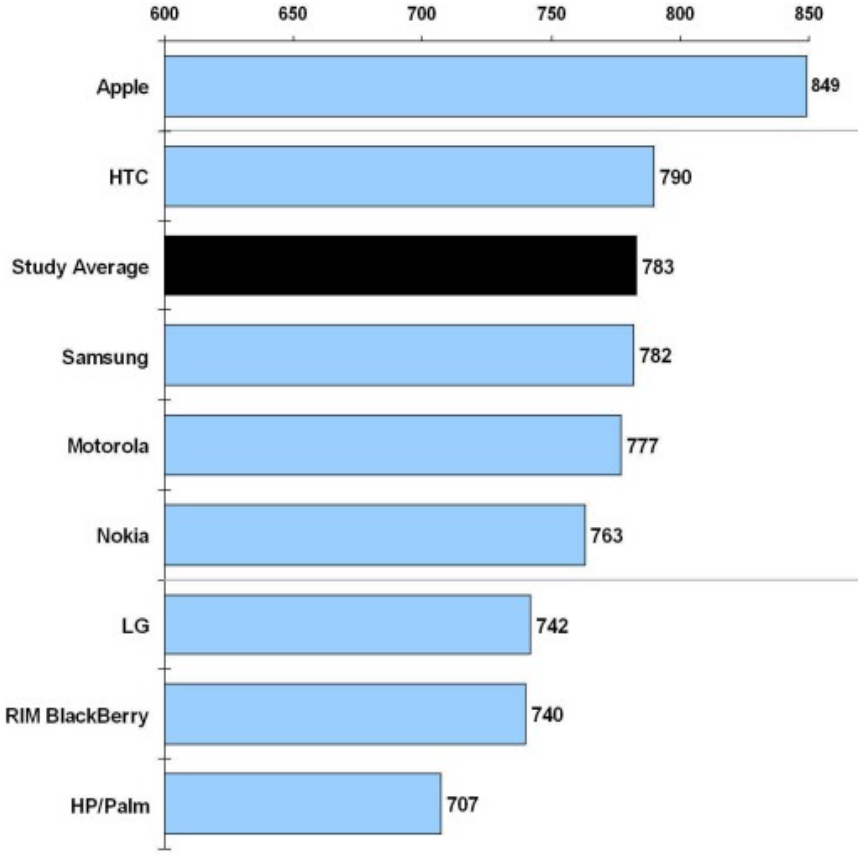
Source: J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study —Volume 1

3.6) SEPTEMBER 2012

According to the J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study —Volume 2, Apple occupied again the top position among manufacturers of smartphones in customer satisfaction. The Company reaches a score of 849 points, showing good performances in all aspects, especially in physical design and ease of operation. The second position in the smartphones rankings is occupied again by HTC (790).
The study measures customer satisfaction with smartphones among owners who have used their current mobile device for less than one year. The key factors of overall satisfaction with smartphones that are taken into consideration for the study are, in order of importance: performance (33%); physical design (23%); features (22%); and ease of operation (22%).

The 2012 U.S. Wireless Smartphone Customer Satisfaction Study—Volume 2 is based on experiences reported by 8,736 smartphone owners and was fielded between January and June 2012.

The J.D. Power and Associates 2012
Wireless Smartphone Satisfaction Study—Volume 2
Overall Wireless Smartphone Index Rankings
(Based on a 1,000-point scale)



Source: J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study —Volume 2

3.7) MARCH 2013

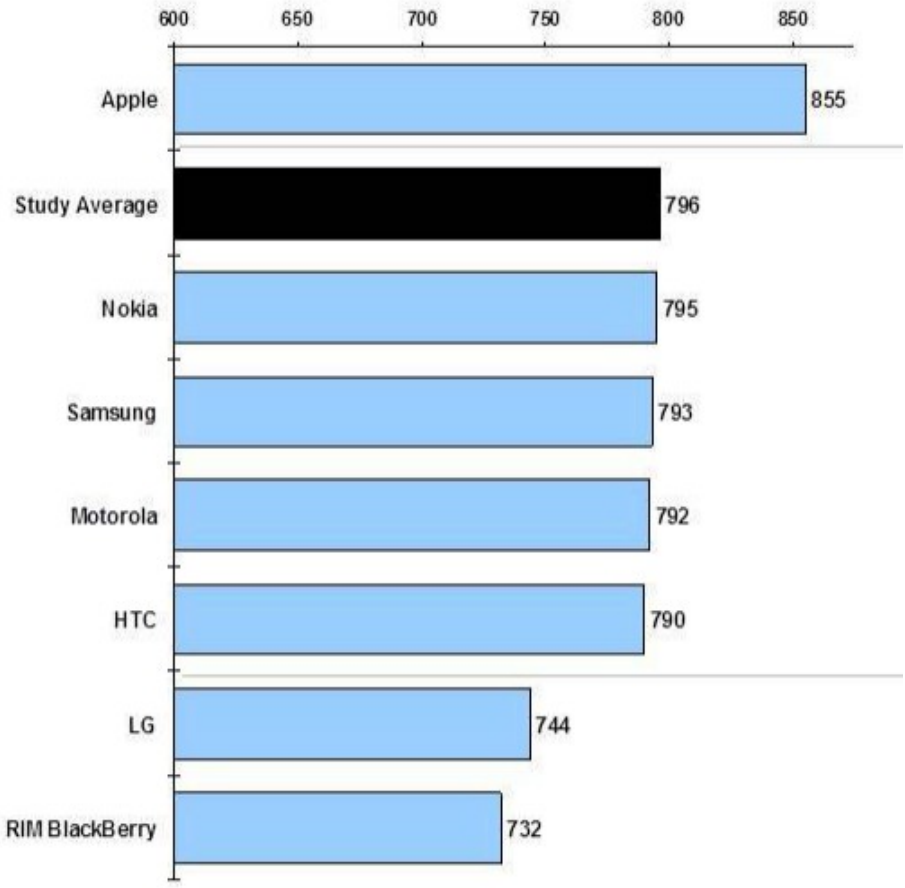
According to the J.D. Power and Associates 2013 U.S. Wireless Smartphone Satisfaction Study—Volume 1, the overall satisfaction among smartphone customers has shown notable improvements, as a consequence of producers' continuous efforts to enhance product style, features, reliability and software.
The study showed that satisfaction among smartphone users in 2013 scored 796 points on 1.000, with an increment of 22 from the previous year. This increase was a consequence of the larger number of new features implemented and services provided by producers, thus offering a more and more comfortable product experience between the operating system employed and the applications it runs.
Customer satisfaction with smartphones has improved under all the aspects compared to the previous year, but in particular the greatest advancement was in performance (scoring 26), as a consequence of the significant improvements in some important features, such as the quality of the camera and the operating system performances and speed.

Kirk Parsons, the senior director of telecommunications services at J.D. Power and Associates, said that *"as the capabilities of wireless phones and their applications continue to expand, and as customers grow more reliant on their device, handset manufacturers have an opportunity to further shape the customer experience and impact satisfaction with better integration of services and more communication options, such as video chat,*" and added that "i*t is important, however, that manufacturers meet the expectations of those customers who take advantage of such offers by ensuring the features are intuitive and, ultimately, rewarding to them. Providing an easy-to-use, yet powerful operating system with the ability to customize applications to suit individual needs is essential to providing a high-quality and rewarding wireless experience*." (Kirk Parsons,J.D. Power and Associates' Press Release, March 2013)

According to the J.D. Power and Associates 2013 U.S. Wireless Smartphone Satisfaction Study—Volume 1, Apple occupied again the top position of customer satisfaction among smartphones producers, reaching a score of 855 points and showing a significantly strong performance in the design and style aspects and in the usability and ease of operation.
The study measures satisfaction with smartphones among users that have been owning their phone for less than a year. The key factors of overall satisfaction with smartphones that are taken into conisderation for the study are, in order of importance: performance (33%); physical design (23%); features (22%); and ease of operation (22%).

The 2013 U.S. Wireless Smartphone Satisfaction Study—Volume 1 is based on the collection of 9,767 customers' evaluations on smartphones and was conducted between July and December 2012.

The J.D. Power and Associates 2013
Wireless Smartphone Satisfaction Study—Volume 1
Overall Wireless Smartphone Index Rankings
(Based on a 1,000-point scale)



Source: J.D. Power and Associates 2013 U.S. Wireless Smartphone Satisfaction Study—Volume 1

3.8) OCTOBER 2014

According to the J.D. Power and Associates 2014 U.S. Wireless Smartphone Satisfaction Study Volume 2, the conflict among smarthphone producers that are fiercely competing during the latest few years in order to gain competitive advantage over the others, has focused in particular on technological improvements and upgrading features. In order to beat competition, they have tried to offer better products to a more and more sophisticated consumer. However, what really differentiates one competitor from another, now, is the operating system a smartphone runs. The OS is becoming increasingly important in the selection that customers practice when searching for the desired phone, but it is fundamental also in defining user experience and satisfaction the smartphone itself.

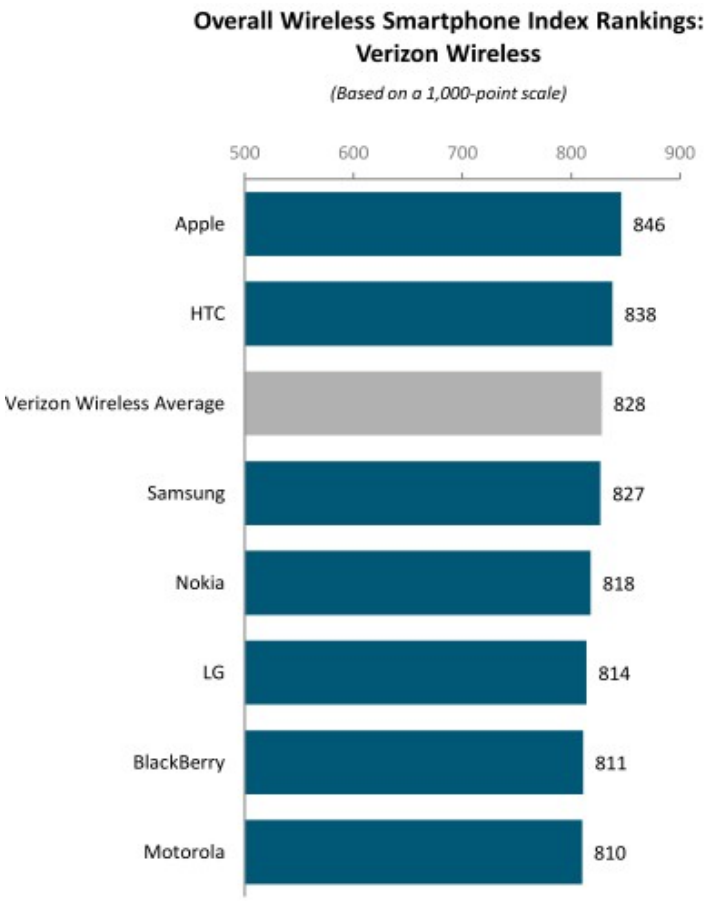
Always according to the 2014 J.D Power and Associates Study, customer satisfaction with the reliability of the OS has increased compared to 2012, in particular it has passed from a score of 7.6 as pointed out by the 2012 J.D Power and Associates Study, to 8.4 as figured by the 2014 J.D. Power and Associates Study.

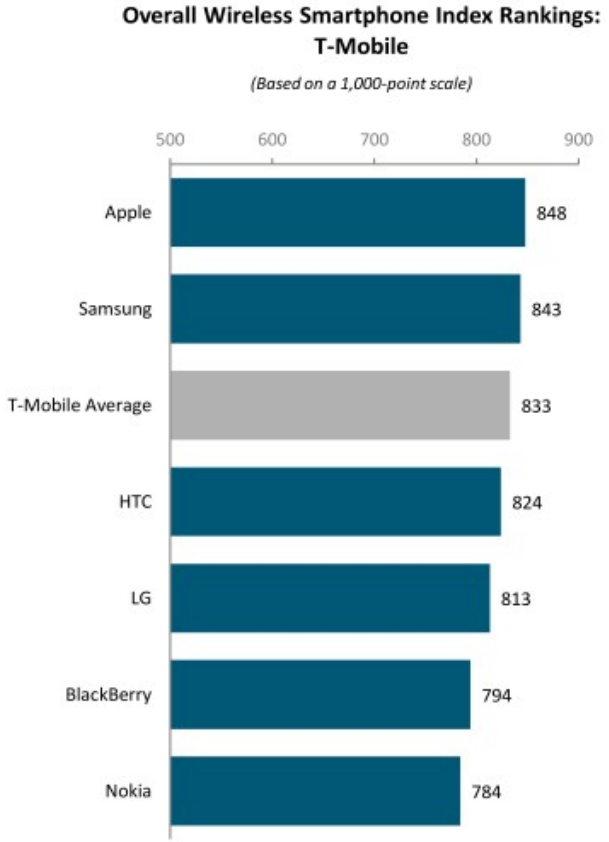
Kirk Parsons, senior director of telecommunications services at J.D. Power, said that *"Providing an easy-to-use, yet powerful operating system with the ability to customize applications to suit individual needs is essential to providing a positive wireless experience",* and added that *"to get ahead of the competition and satisfy customers, manufacturers must meet and exceed the expectations of customers, ensuring the OS allows the device features and services to work intuitively and seamlessly. Doing so will help drive satisfaction and loyalty to the brand."* (Kirk Parsons, J.D. Power and Associates' Press Release, October 2014).

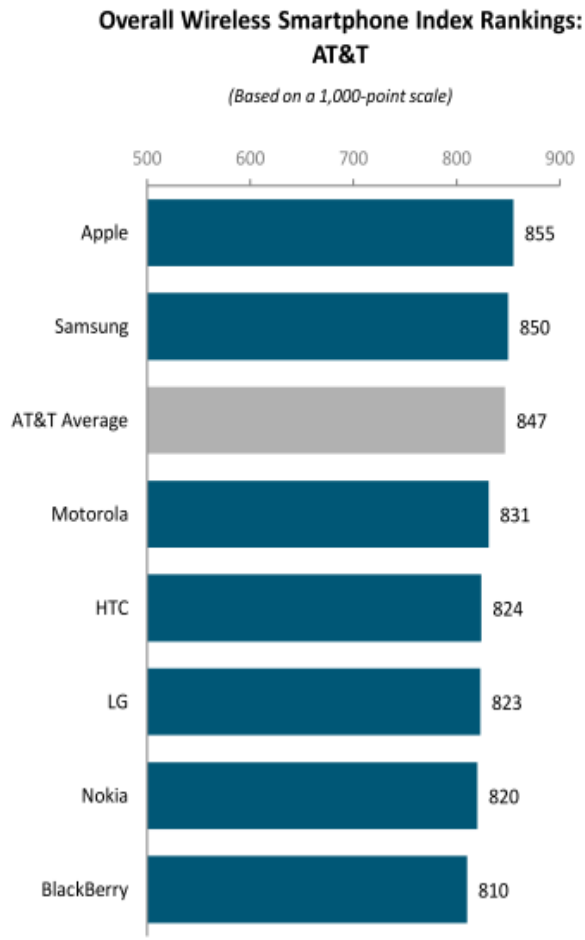
According to the J.D. Power and Associates 2014 U.S. Wireless Smartphone Satisfaction Study—Volume 2, which was conducted among U.S. customers of tier 1 wireless carriers (AT&T, Verizon, Sprint and T-Mobile), Apple was again in the top position in overall satisfaction among customers of AT&T (855), followed by customers of T-Mobile (848) and Verizon Wireless (846). Among customers of Sprint, Apple and Samsung were together in the first position with the same highest ranking of 845 each.
The study measures customer satisfaction considering four key factors which are: performance (29%); features (26%); physical design (23%); and ease of operation (22%). Customer satisfaction with smartphones is provided by referring to tier 1 wireless carriers, meaning that it includes the four national wireless providers in the U.S. and is calculated on a 1,000-point scale.

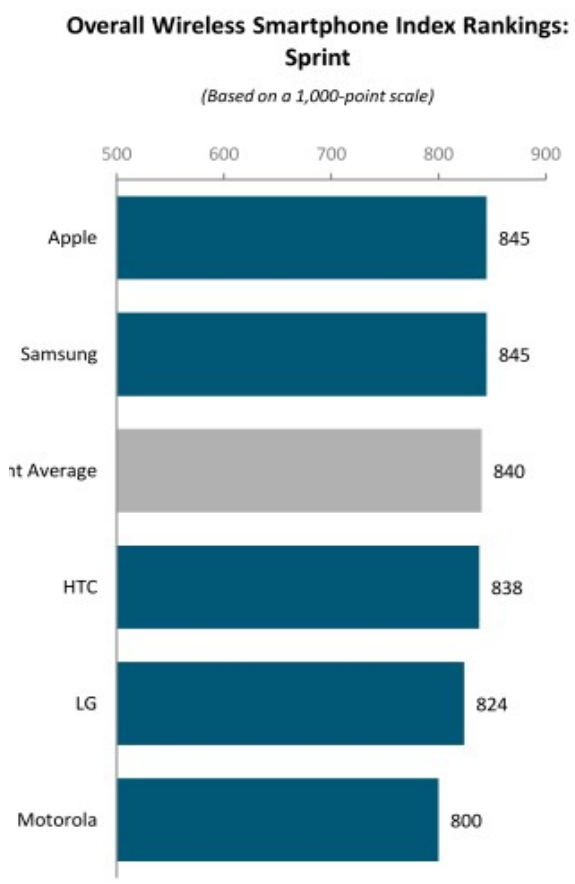
The 2014 U.S. Wireless Smartphone Satisfaction Study—Volume 2 is based on the collection of 15,092 customers' evaluations on smartphones used for less than one year and taking into consideration those who are customers of the four tier 1 carriers. It was conducted between March and August 2014.

J.D. Power and Associates 2014
U.S. Wireless Smartphone Satisfaction Study—Volume 2









Source: J.D. Power and Associates 2014 U.S. Wireless Smartphone Satisfaction Study—Volume 2

3.9) A DECLINING SATISFACTION

All J.D. Power's studies showed that Apple ranked highest in overall satisfaction among smartphones' customers. However the latest statistics of 2014 from the American Consumer Satisfaction Index, which surveys 70,000 U.S. consumers every year, saw for the first time Samsung slightly outdoing Apple by two points with a score of 81 in overall customer satisfaction. Differently from the past, smartphones have become the most important category in Samsung's mobile phone product mix, justifying its higher satisfaction score. According to the ACSI's surveys, Apple declined from 81 to 79 points percentage, just over Motorola and Nokia (now Microsoft) that scores 77. BlackBerry's market share has been almost fading, but satisfaction for its remaining users jumped from 69 to 74.

Samsung also tried to beat Apple in smartphone consumer satisfaction in 2013, before the launch of the iPhone 5S and 5C. According to ACSI's overall satisfaction statistics for 2013, Apple was still on the top of the rankings beating Samsung by five points, but they were one very close to the other for the main part of 2013. Also J.D. Power and Associates' satisfaction study for 2014 classified Apple as the first smartphone brand for the main wireless operators, but again Samsung was not so far from the top.

American Consumer Satisfaction Index
Benchmarks – Smartphone Industry (0-100 scale)*
Year 2014

	2007	2008	2009	2010	2011	2012	2013	2014	Previous Year % Change
Samsung Electronics	70	71	70	76	74	71	76	81	6.6
Apple	NM	NM	NM	NM	NM	83	81	79	-2.5
Cellular Telephones	70	71	72	76	75	74	76	78	2.6
Nokia	72	74	74	76	73	75	76	77	1.3
Motorola Mobility (Google)	72	74	72	76	77	73	77	77	0.0
HTC	NM	NM	NM	NM	NM	75	72	75	4.2
BlackBerry	NM	NM	NM	NM	NM	69	69	74	7.2
LG Electronics	NM	NM	NM	NM	NM	75	71	73	2.8
All Others	70	70	73	77	74	73	76	71	-6.6

*Source: ACSI, Customer Satisfaction Benchmarks by Industry
**NM=Not measured

These were the results for what concerns the device-independent customer satisfaction studies. However, considering the first study on *individual smartphones models* conduced by the American Consumer Satisfaction Index, it takes into account customer satisfaction related to smartphone brands offering customer satisfaction benchmarks for ten of the most sold smartphone models during the last years in the U.S. The study is based on randomly sampled interviews with current smartphone users and started in 2013.
According to it, the top-selling smartphone for Samsung in 2012, the Galaxy S III, had an ACSI benchmark of 84 on a scale from 0 to 100, outdoing by 2 points the iPhone 5 (with 82 points), Apple's 2012 release. Together with the S III, at the top of the ranking there is also another Samsung model, the Galaxy Note II, still scoring 84 points. In the 2013 ACSI study, Galaxy S IV is not considered because the survey was conducted before its release. Below the iPhone 5 there is its predecessor, the iPhone 4S, which scored 82 points, while the iPhone 4 is just a point below at 81. For what concerns the Samsung model released before the Galaxy S III, that is the Galaxy S II, customer satisfaction with it was lower, scoring 78 points. Motorola Mobility's Droid Razr Maxx HD outdid the Galaxy II by 2 points, while the Droid Razr was just below the Samsung model, scoring 77. The bottom of the ranking is occupied by BlackBerry offerings, almost outside the competition, with ASCI scores of 67 and 64, respectively, for its Curve and Bold smartphones.

ACSI Director David VanAmburg said that *"Not only does Samsung edge ahead of all iPhones, Apple customers themselves don't see much difference between the iPhone 4, 4S or 5*", and added that *"the latest earnings report from Apple was better than expected, but the name of the game for Apple has always been innovation. Samsung, on the other hand, shows a strong upward ACSI trend from the Galaxy S II to the Galaxy S III. If the S4 performs as well—or even better—in the eyes of customers, Samsung could threaten Apple's dominance in overall customer satisfaction.*" (VanAmburg, ACSI Press Release, 31 July 2013).

Smartphone Customer Satisfaction 2013 - by model*

Model	Manufacturer	ACSI Score (0-100 Scale)
Galaxy S III	Samsung	84
Galaxy Note II	Samsung	84
iPhone 5	Apple	82
iPhone 4S	Apple	82
iPhone 4	Apple	81
Droid Razr Maxx HD	Motorola Mobility	80
Galaxy S II	Samsung	78
Droid Razr	Motorola Mobility	77
Curve	BlackBerry	67
Bold	BlackBerry	64

*Source: ACSI, Smartphones Customer Satisfaction Study 2013

Thus, even if Apple maintained the top position in 2013 considering the ACSI scores for the device-independent customer satisfaction, Samsung has gained positions, in particular if we look at the device-dependent satisfaction studies.
ACSI Director David VanAmburg said in an interview that: *"The survey revealed that the Samsung phones were attractive for two reasons. One was the larger screen size, which those surveyed found appealing. The other was price, or more accurately perceived value. The rise in customer satisfaction for Samsung's phones, was echoed by Android's rising share of the smartphone market vs. Apple's iOS. A 2013 study from Kantar Worldpanel ComTech shows Android with a 51.5% share to iOS's 42.5%."*
And added that *"Also, it's worth mentioning that the main reason Samsung remains significantly lower than Apple overall is because it still sells feature phones, which consistently get lower customer satisfaction scores no matter who the manufacturer is. Apple, of course, doesn't make feature phones."* (VanAmburg to Forbes Magazine, July 2013)

Taking into consideration the ACSI's study for the subsequent year, 2014, Samsung maintained the top position in the ranking with its older Galaxy Note II at score of 85, outdoing the Samsung model released after it, the Galaxy Note III that scored 81 (ACSI Telecommunication and Information Report, 2014). Moreover, according to the study it seems that Samsung did not receive any advantage from its last model launched in 2013, the Galaxy S IV, which obtained the same satisfaction level of the previous Galaxy S III (both scored 82). The Galaxy S V model was launched in April 2014, after the realization of the study, thus it has not been included. For what concerns Apple, however, the 2013 simultaneous introduction of the iPhone 5C (which received an ACSI score of 84 points) and the iPhone 5S (83 points) has shown better results in satisfaction compared to the iPhone 5 (80 points), which again remainded below the iPhone 4S. An important result of the study is that Apple's customers considered both the new iPhone models to be more

satisfying than the two latest Samsung Galaxy offerings, ranking the iPhone 5S and 5C above the Galaxy SIII and SIV.

Smartphone Customer Satisfaction 2014*

Model	Manufacturer	ACSI Score (0-100 Scale)
Galaxy Note II	Samsung	85
iPhone 5C	Apple	84
iPhone 5S	Apple	83
Galaxy S IV	Samsung	82
Galaxy S III	Samsung	82
Galaxy Note III	Samsung	81
iPhone 4S	Apple	81
iPhone 5	Apple	80
iPhone 4	Apple	77
Galaxy S II	Samsung	72

*Source: ACSI Telecommunication and Information Report 2014

What are the reasons why Apple with its iPhones has been facing a drop in market share and customer satisfaction levels in recent times? Is it a matter of fierce competition, unsustained innovation, high prices, negative social opinion or wrong strategies?
And how has the Company tried to cope with this situation?

In the next chapter I analyzed and explained which have been the reasons for Apple success in its smartphone offering and adoption by the customers during the years, providing insights for what concerns the strategy adopted by the Company and also a theoretical framework about theories on diffusion of technological innovation, that will be useful for the understanding of the agent-based model developed in the last chapter.

CHAPTER 2: The reasons behind iPhone success

PART I: FACTORS OF SUCCESS

Steve Jobs enjoyed an enormous applause when he announced the iPhone at the annual Macworld trade show on January 9, 2007. If the goal was creating interest, Jobs was successful: less than two months later, the term “iPhone” could be found on some 60 million pages on the World Wide Web. But which has been the features that brought the iPhone to become the most successful device of the last years? From the product design itself to the business strategy adoped by Apple, the reasons behind iPhone's success have been numerous.

1.1) A DIFFERENT PRODUCT

One of the most important and universally recognized reasons why the iPhone has enjoyed an enormous success is that Apple's products use the highest quality materials and industrial design characterized by finishing details only featured in finely crafted products, even though they are industrial products. When the first iPhone was launched, it contained the features standard to other phones, including voice connectivity, calendaring and address book and e-mail, but had major differences.
The main difference in the iPhone’s features at that time was the screen. The iPhone presented the largest screen (8.9cm diagonal) compared to any other standard-sized mobile phone. In order to make room for the larger screen the iPhone used a touchscreen with a virtual keyboard for numeric and text input, instead of a physical keyboard or keypad. The simple layout of buttons on the iPhone has immediatey delighted customers who were used to deal with lots of complicated menus, sub-menus and icons. The consumers' preference for simplicity led Apple to choose for an innovative and intuitive interface (West & Mace, 2007).

Another difference is that iPhone was presented as a high-end model of Apple’s successful iPod music and video player line. For this reason, the iPhone was fully integrated into Apple’s iTunes Store, a software-based online digital media store operated by Apple for the buying and downloading of audiovisual products and myriad of other applications. Thus, consumers that had an iPod, found themselves already familiar with the ecosystem created by Apple with its devices.

Moreover, a key to success was also Apple’s platform strategy, which is proprietary. It adapted its computer desktop operating system to run the iPhone, developing a sort of subset of its Mac OS X. Current models of the iPhone are all supported by a series of Unix-based operating systems and with intuitive user interfaces launched, developed, and sold by Apple. These advanced operating systems, which are included in all new Macintosh computers released by Apple, give more added values to the iPhone. The most typical characteristic of the Mac OS X is its graphic interface with lively icons on its menu bar which creates a clearer and quicker access between desktop and windows. Although this feature seems not complicated, it does fully provide a customer-oriented service for all the consumers.

The iPhone also contained a version of the Safari Web browser, adapted from the browser Apple had developed for its personal computers, and enhanced with a touch interface, allowing to easily do web browsing on a small screen, in a highly performing and top quality mobile browsing experience (West & Mace, 2010). This was and important feature for U.S. consumers because of their willingness to try to replicate their fixed-line Internet experience on a mobile phone, but it was important also from an international perspective, where content already created in other countries could be readily available on iPhone without huge modifications.

1.2) A DISRUPTIVE INNOVATION

One of Apple's identified core competencies is innovation. From a technology perspective, Apple has used this core competency to develop a highly functional and usable mobile device which can be considered a disruptive innovation.
"Disruptive innovation" is a term that has been introduced in Christensen (1997). Christensen, a Harvard Business School professor, describe a disruptive innovation as "*a product or service designed for a new set of customers that helps create a new market and value network, eventually disrupting an existing market and value network (over a few years or decades) and displacing an earlier technology"*. The definition is popular in business and technology literature to explain those innovations that bring improvements in a product or service without being expected by the market. This usually comes at first by designing for a different set of consumers in a new market while then lowering prices in the existing one.
Products that are categorized as disruptive innovations transfer a new value proposition to the market in comparison to the one currently provided by existing market participants. These technologies provide features that renovate customers value, even if usually their performance is lower than the one provided by existing products in mainstream markets, and for this reason their initial sales volume is low.

For what concern the iPhone, when it was released in 2007, it had a perfomance that was not in line with the standards existing in the smartphone industry, in particular presenting a poor signal performance, calls often dropped, 2G speed (lower than the 3G speed industry standard), poor camera capabilities (for example presenting a 2 Megapixel, instead of 3-5 of almost all the main rival phone manufacturers), without the possibility of recording videos, lacking not only the keyboard but also native applications.
However, the iPhone was not just a normal mobile phone; rather, it was the world's first, hand-held computer, with the ability of processing data in a way that disrupted the mobile phone market.

Although other rivals offered web browsers, they were clumsy and difficult to use. Differently, Apple's made it easy to surf the web with its web browser. Compared to other smartphone manufacturers, the iPhone's user interface has the characteristic of being simple to use and particularly intuitive. Just by touching with a finger the revolutionary and sensitive screen, the user could read and write an e-mail, texting a message, recording video or taking a picture, going through maps, books, music, games and even make a purchase.

Apple had launched a product that was something completely innovative for different features, but was perceived to have some problems under some other aspects. For this reason the Company began a structured process of improving features and adding functionality in order to readily satisfy customer needs. The process of enhancing the quality of the iPhone each time a new model was being developed, in a continuous improvement, is one of the peculiarities that allowed Apple to maintain its initial success in the smartphone industry. The Company, for example, introduced

iTunes in 2008, in this way strengthening the iPhone's perception as a multi-function device able to provide music and video without interruption.
Another example comes with the iPhone 5: the incremental improvements characterizing it in comparison to the previous iPhone 4s are not radically new: bigger and easier to manipulate screen, lighter aluminum design, faster connection, improved photos' quality, improved software. In fact, some commentators have described the iPhone 5 as "the same old device", adding features that are already implemented both on Android and Windows smartphones, such as the larger screens already available on the Android smartphones.

In conclusion, Apple's product development strategy has not the aim of developing breakthrough technologies each time a model is released. Rather, radical innovations, such as the iPod, iTunes, iPad, and the iPhone, are launched, overturning established market rivals. After this, Apple innovates and improve its breakthrogh products by implementing stable releases, adding features and functionality that seduce its consumers.

1.3) A SUCCESSFUL BUSINESS MODEL

According to Laugesen & Yuan (2010), another important key to success is that Apple focused its control over the value chain in the parts where it has core competencies, controlling and coordinating them, allowing specialized third-parties to manage the remaining parts. Doing so, the Company keeps control and at the same time can focus itself on offering satisfying products and service to its consumers. Not only this allows Apple to control and coordinate the product, platform, application portal, online/offline mediation, but the Company can also offer more service thanks to the applications created for the iPhone. Thus, Apple has full control of the pieces of the value chain where it can create more value, according the main part of service provision, such as application development, to other organizations.

As a matter of fact, although it designs and manufactures iPhone hardware, Apple has realized that from a technology perspective it is the software and not the hardware that will differentiate the future of mobile phones. At the beginning, the Company did not allow third-party software on iPhone, but in July 2008 it changed perspective launching the App Store. In this way Apple could better focus its attention on hardware innovations and foster third parties in developing innovative software applications. Acting as the intermediary for software distribution, the Company provided developers with 70% of revenues while keeping 30% to cover its costs and provide some profits (Laugesen & Yuan, 010).
However, even though Apple lessened its control over the software development of iPhone, such as application development that is open to all developers, it still kept maintaining strict control over the software distribution, because all App Store applications need to be approved by Apple. This strategy is in some aspects similar to the business model adopted for its iPod business, where Apple focused on its core competencies of marketing and product innovation in device manufacturing, music platform, the iTunes portal, and the offline/online mediation, while leaving content development to musicians and network provision to Internet service providers.

Apple created a successful platform able to expand customer's engagement to mobile services thanks to the creation of new applications, thus building a strong demand, but at the same time it allowed the un-complication of the process of software development with the creation of a Software Development Toolkit. From the Company's point of view, the App Store has shown its success since the beginning, reaching $45 million revenue in its first six months from the launch. Facebook, Twitter and other important companies started to develop applications and to make them

available in the App Store. Moreover, rivals such as Google Android and RIM started emulating the App Store by gradually developing their own online application stores, thus strenghtening the platforms as an indicator of success for Apple.
From a customer' point of view, Apple built up a simple way to allow them to be offered quality software from third party service providers. This was something users wanted, and Apple was able to answer to their needs, again fostering the diffusion of the iPhone. Thanks to the creation of the App Store, the iPhone was also perceived as a gaming platform: 90% of the top selling applications are part of the entertainment and gaming offerings (Apple Press Release, 2009).

With the decision to allow third party service providers to develop applications for iPhone, Apple has proven that they are willing to dramatically change the elements of the business model when required: the business model changed following the demands of the market, with Apple giving up control of application development, but maintaining control of the most important aspect of distribution. In this way, they offered the market what it was asking for, while ensuring the quality of the applications that can be placed on the iPhone.

1.4) A WIN-WIN PARTNERSHIP

Initially, Apple chose as a kind of entry strategy an exclusive carrier for each country, being there the only one to sell the iPhone. In the USA it was AT&T, in Germany T-Mobile, in France Orange. In the U.S. for the first iPhone, the exclusive was given to Cingular, that became AT&T in 2007, the largest U.S. carrier. Here, new handsets are usually “locked” to a single carrier in order to guarantee repayment of an initial subsidy by the wireless provider (West & Mace, 2007). This agreement between Apple and AT&T was a winning strategy, because both Apple and AT&T obtained benefits.

By building a partnership with Apple, AT&T gained more subscribers to its service. This strategy was profitable because, in a market almost saturated such as the U.S., the iPhone allowed AT&T to steal users from other providers or upgrade the current ones. Moreover, before the launch of the iPhone, for AT&T was difficult to persuade customers about the possibility to use mobile Internet, while with a device like the iPhone, able to provide simple access to Internet everywhere, selling Internet-data plans became easier. In addition, the agreement with Apple was successful also in incrementing average revenue per user at a time when voice revenues were lowering (Laugesen & Yuan, 2010).

The strategy was profitable also for Apple, since AT&T allowed the iPhone to be available to all its customer base and to gain subsidies for each iPhone sold. Moreover, Apple was granted to sell iPhone contents (music, games, applications) without sharing any revenue with AT&T, concession that in the past AT&T was not allowing to other producers. Thus, the entry of the iPhone has reversed the situation in the mobile phone market, because prior to its release carriers had full power over the mobile phone market, putting at a disadvantage handsets producers (Vogelstein, Wired Magazine, 2008).
Being locked to a single carrier also helped Apple to provide an equal experience to customers through all the iPhones sold at the beginning and, in addition, it allowed to surround the device with an image of a rarity. The iPhone was a scarce product also when successor models were released: consumers who wanted to purchase the last version just launched were made to queue up and sometime spent the night before outside an Apple store. This arose media attention and provided free publicity for Apple.

However, the exclusive carrier system has subsequently changed. In 2008 Apple started opening up

to different operators in each country that they served. For example in Italy, soon after Vodafone announcement that they signed a deal with Apple to sell the iPhone, TIM announced it would also be selling the iPhone there. In the U.S., Verizon started selling the iPhone in 2011, being the second U.S. carrier for the iPhone, after AT&T.
Even if it was a strategic move at the beginning, exclusivity then lost its value. Wireless providers no longer needed to be persuaded by the profitability of the iPhone and Apple by its side not longer needed to search for a compromise when making arrangements with them. Furthermore, the idea of a rare product was no more useful for Apple to convince consumers about the desirability of the iPhones.
Instead, the end of exclusivity had positive consequences for the iPhone, which could expand its availability to a larger base of potential customers. Since Android smartphones are diffused in more countries and through more networks than the iPhone, giving up on exclusivity could allow Apple to gain back market share from Google Adroid's smartphones. Moreover, even if an iPhone could not be perceived as a completly new device, the fact of appearing new to a new network, could help it to be perceive more appealing to users locked to their carrier who were waiting for having the iPhone. Exclusivity arose interest, and Apple knew that when it signed it with AT&T.

1.5) A STRONG BRAND IMAGE AND A LOYAL CUSTOMER BASE

A part from a lot of innovations, another important aspect that lead to the success of the iPhone is the brand image of Apple.
Apple, with its 30 years history, has built and developed its image and reputation thanks to its previous high-quality products that appealed to consumers all around the world (West & M. Mace, 2007). For example, the Apple II was a huge technological improvement compared to the Apple I, lying a solid foundation for the future development of the company. After that, Macintosh, a series of personal computers with a graphical user interface instead of a command-line interface, became successful since 1984. Later, Apple launched the iPod in order to meet the demand of the youngest customers, and this allowed the Company to further expand its fans. This has created an extremely loyal customer base, leading Apple consumers to build a strong expectation on the demand for future Apple products and an attachment to the iPhone, with high switching costs, as iPhone owners are usually not minded to switch to a competitor smartphone.
For many customers, Apple's represents a symbol of wealth, a social status, fashion tastes and unique lifestyles.

One of the main goal of Apple was to offer products that were appealing to the right customers. According to a research conducted in 2008 by M:Metrics, which is the mobile media authority in the U.S. , people that are more inclined to buy the iPhone are usually males, with less than 35 years, have a high level of school education and a wealthy status. Another study proposed by Rubicon Consulting (2008) reaffirmes that half of the iPhone user are less than 30 years, have a passion for technologies, and several times works for the professional, scientific, arts/entertainment or information sectors. Moreover, three quarters of the users have already an Apple product before the iPhone. The profile of the iPhone user is comparable to the one of the iPod user, one of the most successful products developed by the Company. 61% of them use the iPhone for personal purposes, while 24% use it for some business, and just 15% use it exclusively for business use purposes. Thus, the success of the iPhone came in particular from being appealing for personal use, as it provides lots of entertainment applications, but thanks to its sophisticated and complete technology the device also satisfies business customers.

Mobile Internet experience is another strength aspect of the success of the iPhone. As pointed out by Funk (2000), mobile phone users search for advanced and well performing features, so to have a rich and complete experience with their devices, but also easy to reach, because they are used to be provided with a full experience though the fixed-line Internet and need to replicate it also with their phones. People do not want mobile services that are perceived too difficult to use, instead they prefer to simplify the mobile Internet experience. As a matter of fact, in a study conducted by the annual Lemelson-MIT Invention Index study (2004) among consumers in the U.S., the mobile phone has been decleared by one third of the polled as "*the most hated invention*" even if indispensable. As a consequence, one of the key drivers of the success experienced by the iPhone is its ability to reproduce on one mobile phone both the computer and fixed-line rich Internet experience, thus perfectly combining both the PC and the Internet in one efficient device (Mace, 2006).

The iPhone managed to capture a loyal customer base also thanks to its offering of amusement and entertainment applications such as games. A research found out that three factors are very important for U.S. consumers: how much the Internet is seen as safe, the amusement coming from the use of a technology and the use of an innovation linked to the personal social status. iPhone users gain satisfaction thanks to the myriade of gaming and entertainment applications provided by Apple, with the safety that all of them need the approval of Apple before being available, giving users that much-needed sense of security. Moreover, the iPhone is considered as a symbol of social status, able to enforce the belonging of users to a single and favoured society in which everyone shares the same experience with a device that is considered as a lifestyle.

1.5.1) A CASE OF SOCIAL DEVOTION

According to a research carried out by a UK website that offers help to people dealing with SIM contracts, SIMOnlyContracts.co.uk in 2014, several iPhone users acknowledge to be totally loyal to Apple and ready to purchase the latest iPhone model when they have to change their phone, without taking into account Android or BlackBerry competitors.

In the study 2,200 iPhone users were interviewed. About 60% of them admitted to have a "*blind loyalty*" to Apple and 78% affirmed they *"couldn't imagine having a different type of phone"* than an iPhone. However, just 50% of the users said they were *"really impressed"* by Apple's iPhone, providing evidence that they are willing to buy a smartphone they are not really impressed just because it is an Apple's device.
According to the survey, 54% of iPhone customers already had a previous iPhone model before their current one, and 37% affirmed that they would purchase a newer version because of their familiarity with the operating system's interface. For 28% of them, the last model released was simply the best ampng their option when it was time to upgrade, and 25% decleared their preference with the iPhones because of the operating system's applications.
Concerning the version of the iPhone they were currently using, 52% said they owned the iPhone 5, 29% the iPhone 4 or 4S, while only 9% were still owning an iPhone 3 or 3GS and just 1% owned the iPhone 5C or 5S.

Roshan Bholah, the founder of the site that performed the research affirmed that *"It's really interesting to discover this blind loyalty amongst iPhone users, they'll no longer consider other mobile phones on the market, purely because they trust Apple and perhaps like being associated with the brand. However, the old saying 'if it ain't broke, don't fix it' could ring true here, as it's clearly a case of them having a positive experience with the handset. It's ultimately the loyalty all*

brands hope to achieve with their customers, old and new. Product lifecycles are fickle, so it'll be interesting to see how long Apple can maintain this relationship with its customers, not forgetting to mention how long they can keep their competitors at bay." (The Telegraph, Febrary 2014)

As a matter of fact, some of the interviewed users had switched to an iPhone from other competitors' models, in particular 17% were BlackBerry users, 14% Nokia, 9% Samsung, 4% HTC and just 2% upgraded from a Sony device.

PART II: A SUCCESSFUL STRATEGY

The iPhone strategy is one of the main important aspect of Apple's strategy nowadays, even if it was just the last industry entry after personal computers, PDAs and music players.
Apple's strategies are led by all those competencies that the it has learn through its long experience in product marketing and innovation. However, concerning the case of the iPhone, there have been huge shifts in Apple's strategies , in particular from the Steve Job to the Tim Cook era.

2.1) STRATEGY SHIFT IN PRODUCT INNOVATION

Since the iPhone first launch, Apple was very cautious about its smartphones' rollouts by performing long development cycles in order to grow anticipation and offer new innovations for each of the models developed under Steve Jobs. A Professor and Chair of the Department of Economics at LIU Post and Forbes Magazine's Contributor, P. Mourdoukoutas (2012), affirmed that Steve Jobs' strategic choices were *"based on Schumpeterian entrepreneurship and churned out families of radically new products that marry art and technology; and turning market niches into mass markets"*. The CEO's aim was to produce and sell innovative devices in which art and technology were merged together to offer an easy, simple and continuous user experience. Thanks to this strategy, the Company managed to occupy the pole position in the smartphones category, being the leader of a new industry thanks to its original launch of the iPhone in 2007.

After the introduction of the first iPhone, Apple's success continued to increase and expand, thanks to its ability in continuously innovating in the mobilephone industry; as a consequence of this core competence, Apple managed to create a loyal customer base around its brand and smartphones. Jobs' strategy followed a long development cycle process aimed at developing and releasing at least one big innovation each cycle. This new products' releases usually were happening once a year, in the meantime offering the previous iPhone versions at lower prices. Acting like this, the Company gained a strong anticipation for its new devices, because customers were waiting for something new and different each time a new model was presented, but was able to maintain old model sales providing discounts on them and thus cheaper alternatives to customers. Apple's strength was also its ability to attract and maintaining users by creating an ecosystem with all its other products, like the iPad and iTunes, making all of them "talk to each other": as a matter of fact the iPhone had also all the functionalities of an iPod.

When Steve Jobs abandoned his position as CEO of Apple, Tim Cook became the new CEO. He has adopted a new business model for Apple, more based on evolution than revolution in the product development. Differently from Steve Jobs, Tim Cook has been leveraging on Apple's huge loyal customer base to offer only marginal and incremental improvements to the products, because he knew that the Apple's large number of fans would have bought the newest products being released. Dr. Panos Mourdoukoutas (2012) affirmed that, "*Under Tim Cook, Apple has been churning out new versions of old products that are destined to reach their limits. Tim Cook's Apple has yet to launch a new product that may replace the iPhone, the iPad and the MacBook."*
In the passage from the Steve Jobs to the Tim Cook, a new business model changed Apple's strategy: Jobs enhanced the development of brand new innovative technologies, while Cook has only been offering partially improved versions of existent Apple products, concentrating more on reinforcing the existing devices. Where Jobs was at the lead of a company that was almost going to

fail, Cook had to cope with a titan in the technology industry, a reality that was completly different from the company that Jobs built up when he was CEO. So far, he has focused on pushing the already existing products that Apple has released. For example, the iPhone 5 was not a large advancement compared to the previous model: many functionalities of the current model, the iPhone 4, were strengthened and enhanced by increasing its dimension to face with the competition of other larger devices such as those created by Samsung, and providing a proprietary map system instead of maintaining the arrangement with Google Maps. After facing some problems with the new map service at the beginning, the strategic choice allowed Apple to rely less on Google and foster its own service platform.

The consequences of these two differing perspectives are that we can see a sort of pattern emerging within Apple, meaning that there is cycle of 2-3 year cycle for the development and release of new and improved products. The first model that is released is the new large hardware improvement, which provides new features such as larger display, a more performing camera and a more powerful. Then, after a year more or less, Apple develops an updated version of this hardware, for the most part composed of partial improvements and new chips, and usually provides new features. As a matter of fact, the 2-3 year cycle of large hardware improvements is alternated with small hardware/software upgrades coming year by year.

2.2) MARKET ENTRY AND COMPETITOR RESPONSE

When the iPhone was launched, Apple declared that it had signed a U.S. exclusive agreement with AT&T carrier.
Before the launch of the first iPhone, Apple began intense negotiations with the main U.S. carriers, AT&T and Verizon Wireless, helped by its brand name and market position to gain important concessions.
The main arguable concession was that Apple asked for a share of continuous subscriber profits. According to estimates, at the beginning the Company gained from $3 to $18 a month in revenue sharing, corresponding to a share from 5% to 40% of the monthly service charge, while at the meantime claiming support obligations that were usually taken on by the carrier. This aspect has also been seen as one of the main reasons why Apple found it difficult to convince other operators to sell its first device (West & Mace, 2010).
Moreover, the company also required to have control on user experience: the iPhone would be sold only from retail and online locations owned by Apple or AT&T and support would be offered only by Apple itself. AT&T employees had also to do a special training on the phone before the official launch in June. In return, AT&T's aim was to obtain new and more profitable users. At the end it negotiated a 3-year U.S. exclusive concession to the iPhone. With this agreement, Apple precluded the way to other handsets manufacturers in the U.S. and Europe, giving one operator an exclusive for 60 or 90 days, and then distributing popular models across all providers. This acted as a calculated strategy both by Apple and AT&T, showing that loyalty to Apple and the iPhone was higher than loyalty to any other carrier.

Moreover, according to this policy, all iPhone users had to activate AT&T phone service and subscribe to mobile data services. As a matter of fact, a $599 (then $399) phone would need at least a 2-year service contract at a cost of $1400, with the majority of the customers signing plans from $1900 to $2400 (West & Mace, 2010).This move on one hand allowed AT&T to gain certain revenue, and on the other hand also meant that each iPhone owner had a prepaid mobile data plan ai his disposition, thus providing incentives for the casual use of mobile Internet.
This revenue sharing arrangement was strengthened by ‘‘locking’’ the iPhone: in this way it was not

possible to use it on other phone networks. Since 1995, this kind of locking had been practiced by U.S. operators to gain back initial subsidies in order to decrease the starting purchase price of new mobile phones, then adding also a multi-year contracts. Those measures created a switching cost for customers that were bounded with the contracts.
AT&T did not subsidize the initial selling price of the iPhone, but would earn a small profit on the the devices sold in its stores. The new compromise reversed the financial value of the smartphone sale, and moreover modified the conception of the mobile phone from a mere device linked to a service to an valuable part of the customer value proposition. The high gross margins for the device, around 33%, including distribution channel margin, also offered a further reason for smartphones producers to invest in innovation in order to increase their revenues.

At the beginning, Apple focused its efforts on marketing in its home country, where its brand, iPod and iTunes penetration had much strength. In the home market there was also the weakest smartphone competition, because the BlackBerry was leading the market for business-oriented mobile phones but Palm was vanishing from the scenes. Instead, Nokia and Sony Ericsson sold several Symbian phones in Europe, while Japan and Korea were an intimidating scenarios because of market expectations and carriers market power.
Apple's advertising and the huge free publicity to which it that had been exposed, created a huge wait and interest similar to the release of a new videogame platform. Apple sold 270,000 iPhones in the first 30 hours from its availability. However, after the earliest adopters bought the new product, sales were stationary until September 5, when the Company decided a $200 reduction on the price. The response was immediate, boosting sales to 1 million: from the summer to the fall, the 33% price reduction demonstrated to have tripled the demand for the iPhone.

For what concern the release in Europe, at the beginning there was some speculation about the distribution of the iPhone by Vodafone, which was the largest mobile phone operator in Europe partly possessor of Verizon Wireless. However, Vodafone was trying to create its own music store and wanted to control access to content on its network, because was aiming at improving loyalty and commodize mobile phones. In January 2010, Vodafone was the fourth British operator to provide the iPhone.
Apple, in its place, build up partnership with carriers whose goal was to increase their image thanks to the connection with the new and fashionable iPhone. *'These are not negotiations among equals. Apple clearly had the upper hand,"* one analyst told the Financial Times (Maier & Muller, 2007). While Apple arranged for an unknown share of monthly revenues, having just fourteen retail stores in Europe forced it to lessen control over distribution. Thus, the iPhones were sold by the carriers, the thirteen UK retail stores, and major resellers such as Carphone Warehouse.
In November 2007, Apple introduces its smartphone in the three European countries through the mobile phone subsidiaries of the national phone companies:

- in the UK, it was released on November 9 by O2, the former BT Cellnet owned by Spain's Telefonica since 2001. According to the Financial Times, 190,000 iPhones were sold in the first 60 days.
- In Germany, the same day, the iPhone was released by T-Mobile, the mobile franchisee of former PTT Deutsche Telekom. Here in the first 3 months only 70,000 iPhones were sold.
- In France from November 29, the iPhone was sold by Orange, the subsidiary of France Telecom, where 70,000 phones were sold in the first 30 days.

In the third and fourth quarter of 2007, Apple had reached global sales of 1.1 million and 2.3 million devices. Of the latter, about 310,000 were the results of European sales. For the 4th quarter, estimation saw the iPhone ranking the second position in the U.S. market with 28%, behind market-

leader Research in Motion with 41%, Windows Mobile devices at 21% and Palm at 9% (Canalys, 2008).
For the carriers, the key measure of success for the iPhone was attracting new customers; the main reason why operators accepted to share profits with Apple was because of the extra revenues they gained in exchange. An AT&T user choosing an iPhone would at maximum combine a data plan to its bill. But an user passing from another operator added both the data plan and the voice plan, thus giving room for a further arise in profits. According to estimates, the share of new subscribers buying an iPhone and changing from other carriers stood from 40% in the U.S. to 75% in the UK.
Subsequently to the release in Europe, some speculation saw Apple to negotiate exclusive operator arrangements for other big markets such as China and Japan. Nevertheless, Apple never negotiate with an Asian provider for its first iPhone, fact that was seen by someone as a consequence of its revenue sharing requests and the impossibility of the first iPhone to support high-speed UMTS networks.

Even though iPhone had a huge success for what concern the product design and the simpleness of use, it also received lots of critics. In particular, at the beginning there were much criticisms about some aspects that were considered barriers to adoption, such as the $600 price (later lowered to $400) and the slow data speed without a 3G network. The fact that the iPhone was locked to a unique provider together with a first absence of third-party applications, were the reasons why the iPhone was soon picked on by the hackers trying to unlock the phones, thus building up a gray market those devices..
Differently from Symbian, Palm, and Microsoft the mobile phones, for the first iPhone the creation of third-party applications was not permitted, even if the Company fostered the creation of web-based apps. However, the iPhone browser could not make many standard web apps to work because it didn't include Flash middleware, a specification that at the first iPhone release Jobs did not have taken into consideration.
As a consequence to the request for third-party applications, and the favorable attempts by third parties to set up software without Apple's agreement, the Company decided to allow third-party applications creation in 2008. Between the most important lacking applications were instant messenger clients, an e-book reader, and support for location-based services.

The positive and negative of the iPhone, thus, provided rival hardware companies with a target to reach, while Apple's exclusive distribution arrangement strongly induced rivals like Verizon in the U.S. and Vodafone in Europe to promot rival handsets such as LG and Nokia's.
Because of the product, the system employed and the exclusive contracts, the the Company gave existence to different kinds of rival. Most of them were among the major, strongest and most competent actors of the smartphones industry.
For what concern the hardware, at the beginning the iPhone did not collect product responses from the most important European producers, that kept on offering Symbian devices: Nokia shipped all smartphones provided with different types of keypad and keyboards; Sony Ericsson sold pen-based devices. Even if Nokia was performing well in the sale of its phones, it didn't present a strong share in the fast growing U.S market and its global market share declined. A few after the launch of the iPhone, in 2007, Nokia revealed a model of smartphone very similar to an iPhone, with a touchscreen interface. However, Nokia did not ship a product until the Nokia 5800 in 2008.
Asian manufacturers, in particular Samsung and LG, where the first to respond to the hardware competition in the U.S.: they had already started to realize touchscreen handsets. Some of the rival smartphones (like the LG Voyager sold by Verizon or HTC G1 from T-Mobile) presented a touchscreen but also a physical keyboard. Research in Motion was another producer that react soon to the new competition arisen, keeping on winning market share with its BlackBerry mobile phone, and launching its first touchscreen phone autumn 2008. These iPhone competitors were largely

promoted by providers that had been left out by the iPhone exclusive, especially the 50% of the U.S. market that used CDMA technology (led by Verizon and Sprint) and thus lacked access to the GSM-only Apple, Nokia, or Sony Ericsson phones (West & Mace, 2010).
A more immediate reply by Nokia to Apple came in August 2007, when Nokia disclosed with great anticipation its own content distribution website competing and trying to outdo the iTunes Store, by using its control over the device interface to carry users to the site. Nokia's Ovi Store was projected to offer music, games, and user-generated content. However, when it was actually introduces in 2009, the site was not so successful among reviewers, who complained about its user experience.
In the same period, Vodafone, Verizon and others kept on fostering their own music stores. A part from the successful Cyworld (owned by Korean provider SK Telecom), the majority of the other operator stores has shown itself failing in the U.S. and Europe. As a matter of figures, during 2008, Apple's global iTunes downloads were composed of 6.3 million songs and 300,000 videos per day, differently from the 450,000 songs and videos downloaded from Verizon Store, which was the major operator-specific store in the US.
Moreover, those competing providers had also the disadvantage of having a restricted content pricing power, because of customers getting accustomed to the prices set by Apple's iTunes, with the main iTunes rival forced to equalize or been cheaper than Apple's prices. Another disadvantage stood also in the difficulty of operators to replicate the simpleness of use of the iTunes/iPhone system: this because they where committed to outside mobile phone vendors and thus did not have control over the systems, like did Apple with its own, nor have the experience in creating them.

2.3) A CONSTRAINED DIVERSIFICATION

According to Collis & Montgomery (1999), there are two different definition of diversification: linked and constrained. Linked diversification characterizes those companies that enter a new business which is for some reasons linked to another one where they are already present, but without having relations to their other businesses. Those companies do not show a deep consistency with their general corporate strategy. On the other hand, companies that are characterized by a constrained diversification only enter a new business if it has connection with their core resources or competencies. In this case companies are more prone to be focused in their strategy, where competencies are shared between different businesses and so enhanced.
Apple is a case of constrained diversification. It produces personal computer, both the hardware and the software part, and its businesses uses the Company's core competencies in order to produce hardware and software. Apple's products, from the Mac to the iPhone, are all computers and the Company can allocate and distribute resources across multiple businesses. Taking into consideration the software, all the devices run Apple's OS X proprietary system, thus allowing the emergence of economies of scope and saving costs thanks to the resources sharing (Baxter, 2010).

For Apple, businesses are not just linked, but forms a complete ecosystem in which each branch is a centered system composed of products with the same characteristic. Considering the personal computer, there are both desktop and notebook: they comes in distinct product lines, but each one share resources with the other creating a coherent and consistent system. The two different Mac are made by aluminum and glass, thus using the same materials and saving costs; moreover they are similar and comparable, thus providing and idea of connection and homogeneity among the product lines.
The platforms that compose such interrelated ecosystem are also complementary between them. Apple's personal computers sync with the other devices all the information stored, such as media and personal data, without interruptions and discontinuity. Since they are characterized by working perfectly together, the customer who have devices of different platforms enjoys an experience in

which everything operate optimally.
This is not a peculiarity that works only with Apple's devices. If we think about iTunes, customers can buy music, videos and TV shows and syncs them across their iPhone or iPad. Through the App Store the customers can download applications for their iPhones and iPads from everywhere, while through the iBook Store they can download books and share them with all the devices they own.
Sinche the Company paid a lot of attention which businesses to enter, all the platforms has the power to strengthen the others, creating a more powerful and reinforced system. At the end of the story, the sum of all these parts allow the users to dispose of a complete package for consumers, which is a competitive advantage for Apple, difficult to be replicated by its rivals. This platform strategy gives each single business a further value, which would not be the same if each business would be a separate entity.

2.4) THE INTEGRATION STRATEGY

As explained in Part I of this chapter, Apple's uses a hardware-software integration strategy. Apple controls the iPhone's hardware and software (applications development is left to third parties but need the approval from Apple that also control their distribution) so that they can guarantee that customers are provided with instant access to OS updates and that the hardware attributes are symmetrical through the whole platform. This is an important point on one hand for developers, because if their application are available on the App Store, each iPhone owner can use their application, and on the other hand for customers, since they do not have problems with being trapped into an old versions of iPhone operating system, or with the incompatibility of the applications with their hardware (West & Mace, 2007).

Moreover, another key point of the integration strategy is that, since Apple has full control of both the hardware and the software, it can provide to its customers a high quality, which is difficult to replicate by its rivals. The Company can create hardware and software specifics that rivals cannot grab, so that Apple's products are even more worthy. The fact that the Company controls both the hardware and software is the finest way for it to differentiate its offerings, since Apple is able to assure the quality of its products and develop innovations and functionality that are particular for the platform. This represents a successful strategy for Apple in order to compete in the smartphone market, but it also allows the aim of continuously reshape it. The Company controlling the hardware and software can in this way perform radical changes faster, modifying its business model en route, as necessity emerges. This kind of strategy, in Mintzberg's (1978) classic definition, is said to be emergent, because it is gradually and flexibly shaped during an interative process of thinking and doing.

2.5) A WINNING PRICE STRATEGY

For what concern the pricing of the iPhone, Apple carried out a pricing strategy of skimming and versioning (Nielson, 2014). We have a skimming pricing strategy when prices are high at first, in order to earn high revenues to gain high profits from customers that buy the product in the first phase of the launch into the market. Subsequently we have a versioning pricing strategy when prices are lowered (concerning the iPhone this is a consequence of the initial exclusive AT&T subsidies) in order to reach to the main part of the customers. The agreements that Apple signed with wireless carriers and the subsidies that it generated have helped Apple to decrease its prices to $99 in the U.S., while the off-contract price of the first iPhone when it was released in 2007 was $599. Subsidizing prices has prove to be a strategic and successful move for the iPhone, because it

created the possibility to mass-market the device to the general U.S. customer. Versioning pricing strategy is also performed for different geographic location, because different markets has different willingness to pay. For what concerns the Japanise market, for example, the iPhone was being offered by Softbank without any subsidy on a two-year contract base, differently from the U.S. market where it was sold for $99 on a two-year contract base.

As we have already mentioned before, Apple aims at expanding the market demand for its devices following a product differentiation strategy, thus developing unique products that are perceived as fashionable and stylish by its customers: Apple's products distinguishes from the competitors' ones by being finely designed, quite like they would be craft-made products. Even if it has fighted against a fierce competition, Apple managed to build a strong and growing demand for its devices, allowing the Company itself to handle power over prices by differentiating its products, advertising them in an innovative way, grabbing a strong brand loyalty, and intensively promoting the release of new models. Thanks to its ability to center its attention on those consumers that are willing to pay more and to maintain a premium price at the cost of unit volume, the Company also built up a solid barrier for protecting itself from the entry of rivals into the market.

For what concerns the retail perspective, Apple adopted a strategy called "minimum advertised price". This pricing policies do not allow resellers to advertise a manufacturer's products under a certain minimum price. The minimum advertised price is normally strengthen through marketing subsidies offered by a manufacturer to its resellers.
Apple is able to sustain the fame of its high-priced devices by only proposing retailers such as Wal-Mart or Best Buy a marginal wholesale discount. For such a small portion of savings and profit margin, retailers are not able to provide large discounts on Apple's devices, so that buyers at the end pay a price that is very similar to the retail price that the manufacturer recommend. However, a retailer can choose to cede this margin in order to provide discounts and increase the number of the customers buying the products. In order to impede this from happening, Apple offers incentives to retailers to sell its products at the minimum advertised price set by the company.
This practice is an efficient move because it impedes resellers to create a direct competition with the Company's proprietary stores, and it also prevents a retailer from taking an advantageous position over another. As a matter of fact, Apple's distribution channels are maintained neat and profits coming from its direct sales are enhanced.

Apple has always aimed at offering first class devices as well as setting a premium price. Its less expensive products have normally a mid price, but always guaranteeing a highly valuable user experience thanks to their characteristics. Hardware and software are developed to offer a high quality at a right price that maintains revenues high. Since Apple possesses a competitive advantage that allows it to set a premium price, the above the average prices are justified, but only if the Company is able to maintain this advantage. Some analysts think that the brand is going to lose its unique and attractive appeal: this could be the result of a growing competition from Android and low-cost devices, but also the consequence of a saturation in the developed markets, causing Apple to go towards the risk of transforming its brand in a too-exclusive reality .
Taking a look to IDC's forecasts on the smartphone industry (2013), projections on the average selling price for mobile phone show that it is continuously decreasing with the consequence of increasing market growth. Android operating system has allowed the entry of new smartphone producers into the market, most of which have concentrated their efforts on producing low-cost mobile phones, in an attempt to create brand awareness. According to IDC, in 2013 smartphone average selling prices hit $337, that is a 12.8% more compared to the $387 registered the year before. This trend is likely to persist during the next years, and forecasts on smartphone average selling prices are expected to gradually decrease till $265 by 2017.

PART III: THE DIFFUSION AND ADOPTION OF INNOVATIONS

A THEORETICAL BACKGROUND

In order to understand why Apple decided to change its strategy, in particular by underpricing its brand new technology in the very last years, and what is the rational behind its new pricing campaign, we need to provide some theoretical background about the diffusion of innovations and the models that were developed to study this process and its implication in a transition from an old and established technology to a new one. This allows me to provide the basis for the explanation of the model developed in the next chapter.

3.1) ROGERS' DIFFUSION OF INNOVATIONS

The theory of diffusion of innovation concerns the study of the processes through which a new technology expands through different cultures. The theory was made famous by a professor of Communication, Everett Rogers, who in 1962 described it in his book *Diffusion of Innovations.* According to Rogers the diffusion is the process through which an innovation is trasfered by means of determined channels to the agents of a social system in a period of time. As he argued in this book, an innovation is "*an idea, practice, or project that is perceived as new by an individual or other unit of adoption"*. Regarless when it is created, an innovation can be considered new if agents recognized it as new, even if it has been invented in a distant period of time.

There are some individuals that are more prone than others to adopt an innovation. Thus the process of adoption does not happen at the same time for all the agents belonging to a social system. As a matter of fact, individuals that adopt an innovation earlier presents different characteristic from those who adopt it in subsequent periods. These different characteristics are fundamental to be distinguished when an innovation has to be released to a specific population, so that it will be possible to properly spread it among it. According to Rogers, such population includes different types of categories concerning the characteristics of the adopters that compose them. The classification suggested by the author, according to different level of innovation, is declined into five standardized groups of adopters. The adoption of an innovation over a period of time is represented as an S curve and the categories of adopters are plotted against time. These are innovators, early adopters, early majority, late majority and laggards, plus one more category added later, leapfroggers.

1. **Innovators** - These individuals are first to adopt an innovation. They are audacious risk-takers and are interested in new ideas. They have the highest social status and usually income, are in contact with scientific sources and are opened to communication with other innovators. Since they are more prone to take risks, they may adopt a technologies that be unsuccessful.

2. **Early Adopters** - These individual are opinion leaders among the adopter categories, are opened to changes and feel relaxed when it comes to adopt an innovation. They have a higher social status and education, dispose of an income, and are more prone to social

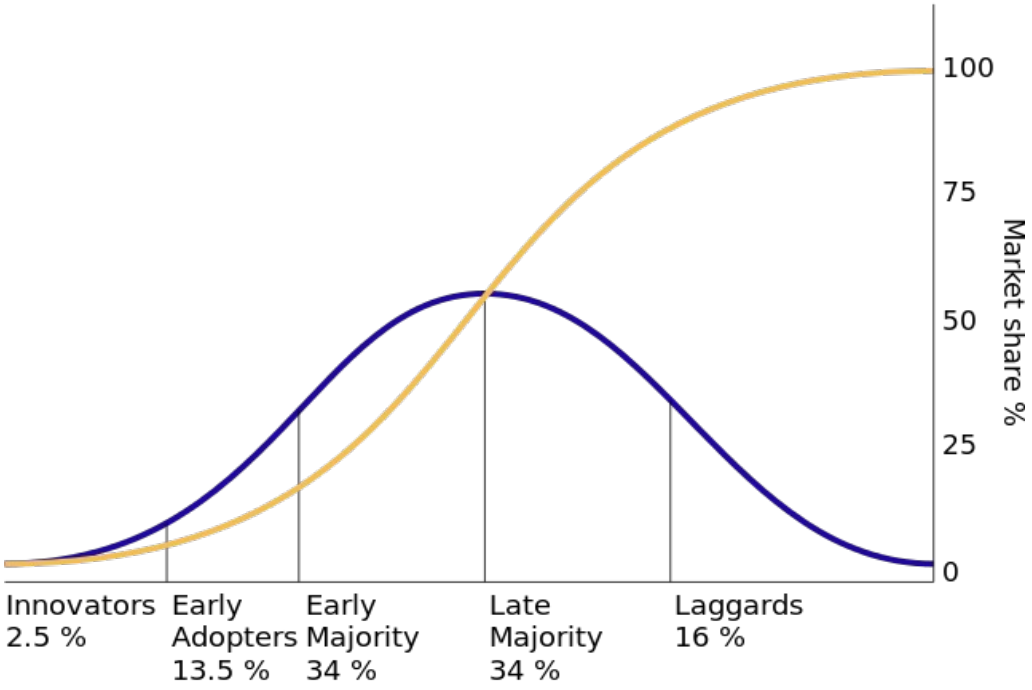
communication. They are more rational when deciding to adopt compared to innovators.

3. **Early Majority** - These agents adopt innovations prior to the average individual, but seldom are leaders. However, before deciding to adopt they usually need to gather evidence that the new idea works. They adopt an innovation significantly later compared to innovators and early adopters. They have above average social status and communicate with early adopters.

4. **Late Majority** - These category includes those individuals that are skeptical of innovation, and adopt it when the majority has already tested it. They search for information about how many individuals have adopted the innovation with satisfying outcomes. They adopt an innovation in a subsequent period compared to the previous categories. They have below average social status, little income, and communicate mostly with others of their same category or in early majority.

5. **Laggards** - These individuals are mostly tied to tradition and very little prone to change. They are the most difficult category to convince about adopting an innovation.They need to be convinced by statistics in order to adopt and to feel pressure from other adopter groups. They have lowest social status, lowest income, are oldest among adopters, and communicate with only family and close friends.
6. **Leapfroggers –** They are individuals that usually do not adopt previous innovations but jump immediately to most recent technologies.

Rogers' Diffusion of Innovations



The figure shows the diffusion of innovations according to Rogers. The blue line shows successive groups of consumers adopting the new technology, while the yellow curve, a logistic function, shows its market share that a certain point reach the saturation level. In mathematics, the yellow curve is known as the logistic function. The curve is broken into sections of adopters.

Rogers proposes that adopters of any new innovation are divided into specific rates of adoption forming a S-shaped curve: innovators 2.5%, early adopters 13.5%, early majority 34%, late majority 34% and laggards 16%. These categories are helpful to offer a common definition for innovation researchers. Each adopter's willingness and ability to adopt an innovation depends on their awareness, interest, evaluation, trial, and adoption.
The graph above depicts a cumulative rate of adopters during time, which starts slowly at the beginning, are faster when adoption spread, then declining againg until only a small part of laggards have not adopted.

One of the main notions in Rogers's literature is what he named the "innovation-decision process". It describes the process an agent follows in deciding whether to adopt an innovation. The agent involved may be a single individual or a group. The process occurs through five stages: knowledge, persuasion, decision, implementation, and confirmation:

- **Knowledge**. In the first phase, the entity is first exposed to an innovation, but does not have information about it. However at this stage the individual has not yet intentions to search for more information about the innovation.
- **Persuasion**. At that point the entity is interested in the innovation and search for information concerning it.
- **Decision**. The entity takes into account the eventuality of the change and measure the pros and cons of adopting the innovation. Thus, he decides for adoping or not. Because it is an individual phase, Rogers pointed out that this is the most difficult stage on which to collect empirical evidence.
- **Implementation**. The entity uses the innovation at different levels concerning with the situation. Here the individual also delineates the convenience of the technology and search for further information about it.
- **Confirmation**. The entity finally decides to keep on employing the innovation. The individual uses the technology at the maximum level. This phase is both intrapersonal and interpersonal, and confirms that the person has made the right choice.

However, Rogers also argued that, after having adopted an innovation, the individual might stop using the technology. As a matter of fact, after having used it for a while, the individual may abandon the innovation. This is a *discontinuance* that can present itself because for example the technology has reached the *obsolescence,* thus stopping to run, or has little expectation to last in its use.
Replacement is a different kind of obsolescence and comes when a broken innovation is replaced by a new version. However a technology could also be left for being changed with a another version. Some examples are the upgrade of a computer with the latest software or the buying of a newer model of mobile phone.
There is also another kind of discontinuance, which is called disenchantment rejection, or abandonment. This happens when the user of an innovation is no more satisfied with it and so prefers to stop using it. In this case, user can decide to abandon the technology in a conscious way, or he could gradually use it less and less until it is forgotten. As a consequence, for this kind of discontinuance, the user's process of learning, deciding, and implementing the innovation into his life has been non useful and a waste of time.

3.2) MODELS OF DIFFUSION OF INNOVATIONS

3.2.1) THE BASS MODEL

After Rogers' theory on the diffusion of innovations, much literature have been developed in that field. One of the most influential works concerning the diffusion and adoption of a new technology was theorized by Frank Bass in its paper *"A new product growth model for consumer durables*" in 1969. He developed a model, known as The Bass Model or Bass Diffusion Model, that added some mathematical ideas to Rogers' theory. The model is composed of an equation that describes the process through which new products are adopted in a social system. and the interaction between current adopters and potential adopters of a new product. The model makes a distinction between innovators and imitators and considers the time in which an adoption occurs, which is a function of the level of innovativeness and imitation behavior among adopters. The Bass model has been found useful to make forecasts, in particular about new products' sales and technology.

Starting from Rogers' theory, Bass explained that apart from innovators (defined as the first two and one-half percent of the adopters), *"adopters are influenced in the timing of adoption by the pressures of the social system, the pressure increasing for later adopters with the number of previous adopters"* (Bass, 1969). Moreover, always excluding innovators, adopters are influenced by different levels of imitation. Bass turned this conception into mathematics and synthesized a conditional probability of adoption that at time *t* was a linear function of the number of previous adoptions. The intercept of the probability was termed *"coefficient of innovation"* (not associated with the cumulative adopter function), while the coefficient that was multiplied times the cumulative function was named *"the coefficient of imitation"* (showing the influence of previous adopters on the conditional probability of adoption. Bass then derived from the probability function the unconditional probability of adoption at time *t* (on the left) and multiplying the ultimate number of adopters by a parameter he carried out the following equation:

$$\frac{f(t)}{1-F(t)} = p + qF(t)$$

Where:

- $f(t)$ is the change of the installed base fraction
- $F(t)$ is the installed base fraction
- p is the coefficient of innovation, also called external influence or advertising effect.
- q is the coefficient of imitation, also called word of mouth effect or internal influence.

The equation has a closed-form solution in the time domain and when q is greater than p, the solution has a peak and then decreases.
Sales $S(t)$ is the rate of change of installed base (thus the adoption) $f(t)$ multiplied by the ultimate market potential m:

$$S(t) = m\, f(t)$$

$$S(t) = m \frac{\left(1 - e^{-(p+q)t}\right)}{\left(1 + \frac{q}{p} e^{-(p+q)t}\right)}$$

The time of peak sales t^*:

$$t^* = \frac{\ln q - \ln p}{p + q}$$

For time t is measured in years we have some values of the parameters:

- The average value of p has been found to be 0.03, and is often < 0.01
- The average value of q has been found to be 0.38, and it ranges from 0.3 to 0.5

The model can be used to make forecast before a product is released, when there are no sales to form expectations. Estimates for the parameters of the model have been performed, for both a number of products and services leading to simulation of empirical studies with the Bass model. The Bass model pattern of adoption over time is an empirical generalization and, although the general pattern of sales growth to a peak and then decline is expected, there remains uncertainty about the speed of growth and decline. However, the existence of data of sales histories of previously introduced products and services suggests the approach of "guessing by analogy" by which the p and q parameters for the new product are determined by a guess as to which product or products in the database are likely to be most similar to the new product in diffusion pattern features. The market potential parameter may be guessed on the basis of known market characteristics and perhaps supplemented by intentions data from surveys.
The cumulative version of the Bass model is an S-shaped curve. There are many S-shaped curves, of course, and these curves have been used extensively to describe and forecast a large variety of growth phenomena. Unlike other growth models the Bass model was derived from a basic premise about diffusion and, as a consequence, the parameters have intuitive interpretations in a diffusion context. In addition, in most contexts the focus of the "Bass Curve" is the unconditional likelihood of purchase at time t rather than the cumulative distribution. As a consequence, attention is centered on the pattern of adoption (or sales) of a peak and decline which, in most cases, is the primary pattern of interest to managers. In summary, the Bass paper has been influential because it contains a simple, elegant theory that predicts and explains the existence of an empirical generalization and because the underlying premise of the theory has an intuitive appeal and the resulting parameters have intuitive interpretations (Bass, 1969).

3.2.2) THE NORTON BASS MODEL

The literature concerning the diffusion of innovations has grown to a substantial size and continues to expand. Most of it involves developments that are extensions of the Bass model. As Bass himself explains, technological products come in generations. A new generation represents an improvement over the earlier generations so that buyers of earlier generations flow over time to the latest generation and the market expands as uses and applications grow as the technology improves. With the emergence of digital technologies and the growth in products that evolve rapidly in successive generations, the importance of generational diffusion models has grown. The first generational diffusion model of sales was published by Norton and Bass (1987). This model is an extension of the Bass model and it is considered the pioneering work in describing multi-generation diffusion. The model premises are that each generation has its own market potential and market penetration process, and adopters of earlier generations can shift to newer generations.

The theoretical system of equations of the Norton Bass model for sales of products with continuous repeat purchasing is presented for three generations, for simplicity, as

$$S_{1,t} = F(t_1)m_1\,[\,1 - F(t_2)]\,,$$

$$S_{2,t} = F(t_2)[\,m_2 + F(t_1)m_1]\,[1 - F(t_3)], \qquad (1)$$

$$S_{3,t} = \{\,m_3 + F(t_2)[m_2 + F(t_1)m_1]\,\},$$

where:

- $m_i = a_i\, M_i$ and M_i is the *incremental* number of ultimate adopters of the *i*th generation product (assum-ing that there are no further generations);
- a_i is the average (continuous) repeat buying rate among adopters of the *i*th generation product;
- t_i is the time since the introduction of the ith generation product;
- and

$$F(t_i) = \frac{1 - e^{-(p+q)\,ti}}{1 + \frac{q}{p}\,e^{-(p+q)\,ti}}$$

The last equation above is the cumulative distribution representation of the Bass model and in this version of the Norton Bass model the *ps* and *qs* are assumed to be the same for each generation so that the *F* functions are without subscripts. In the more general version of the model *ps* and *qs* can be permitted to vary by generation. Experience in fitting the model to a substantial number of generational products and services (Norton & Bass, 1992) indicates that in most cases, remarkably, the fit of the model to the data is not greatly improved when the *ps* and *qs* are allowed to vary by generation. This is not always true, however, and there are instances where diffusion rates vary substantially from one generation to the next.
The system of equations for three generations indicated in (1) can be extended to any number of generations and the model has been estimated for many different product categories. In the system of equations sales of generation one at time *t* are a function of m_1, before generation two arrives, then are a function of m_1 minus what the second steals. Sales of generation two at time *t* are a function of m_2 and m_1 before generation three arrives, then are a function of m_2 plus m_1 minus what the third steals. Sales of generation three are a function of m_3, m_2, and m_1, until the fourth generation enters, and so on. Because the underlying adoption process is specified as the Bass Model a diffusion process governs adoption timing.

3.2.3) THE GENERALIZED BASS MODEL

The first employments of the Bass model were a modified version to involve price with the purpose to search for optimal pricing policies for new products. Changes in prices and other decision variables are responsible for influencing the demand side of the diffusion. Thus, it is useful and important to have a model that can give insight for estimating the effects of decision variables on

the diffusion process. During the1990s, in relation with the question on how decision variables had to be incorporated in diffusion models, Bass, together with Trichy Krishnan and Dipak Jain, elaborated a "Generalized Bass Model" (1994). Since we always see the "Bass Curve" of sales of new products increasing to a peak and then decreasing and since we know that there are wide variations in pricing and other decision variable policies over the many new products, yet all the sales curves are "Bass Curves." Decision variables were included in the diffusion model in a way that, under ordinary circumstances, the shape of the curve would be maintained. The Generalized Bass Model is a "higher-level theory" that has demonstrated to be to be insightful for managerial purposes, because it can be used to study policies that will "shift the curve." The model has empirical support for cases where price and advertising data are decision variables and explains why the Bass Model fits the data without including decision variables, an explanation that is lacking in the other diffusion models that include decision variables.
The equation is the following:

$$\frac{f(t)}{1- F(t)} = [\, p + q\, F(t)]\, x(t)$$

where *x(t)* is a function of percentage change in price and other variables.

3.2.4) A GENERALIZED NORTON-BASS MODEL

However, the Norton-Bass model is not applicable to all business scenarios. The main reason is that, when considering those adopters that upgrade to a new generation technolohy, the model does not take into account the difference between those who already adopted an previous technology and those who never adopted a technology before. Norton and Bass did recognized the presence of the two different groups of adopters, and knew that their model didn't make dinstinction among them. For this reason, Norton-Bass model is not useful to assess the number of cross-generation repeat purchases. Moreover, it cannot be used to forecast future demand or revenues with certainty.
To overcome this limitation, Zhengrui Jiang and Dipak C. Jain published a study in 2012, called *"A Generalized Norton Bass Model for Multigeneration Diffusion"*, in which they allowed the differentiation between leapfrogging and switching (upgrading). According to them, when a new product generation is launched, it is not sure that all adopters will immediately appropriate it. For example, there could be some new adopters buying an older technology, maybe not knowing that the new one is available, or not perceiving the new generation as proven and satisfying. Then, during the time, the new technology will be known more and more, and better product support will be available, so that it become more attractive to potential adopters. As a consequence, the new adopters who do not want to buy the previous generations but are willing to adopt directly the new one will grow during the time. This kind of behavior, where adopters didn't adopted previous technology but skipped directly to the last one available is named *leapfrogging.*
Moreover, there could be also those adopters that bought an older generation but now want to buy the new one, admitting that the progresses with the new technology are perceived as worthy. This kind of behavior is defined *switching,* or *upgrading*. Also in this case the share of upgrades increases with time. The main difference between switching and leapfrogging is that the former leads to cross-generation repeat purchases from the same adopter, while the latter does not. Thus, this differentiation allows to take into account cross-generation repeat purchases by the same adopters.

3.3) AGENT-BASED MODELING IN THE CONTEXT OF INNOVATION

In the last decades several agent-based models dealing with innovation and technological change have been proposed. An agent-based model (ABM) is a simulation tool whose application has covered lots of different fields in the last years, covering also business problems. In an agent-based model a group of agents that makes decisions are analyzed. The agents singularly evaluate their positions and decide according to a number of rules. They can perform different actions on the basis of the category they stand for, like, producing, consuming, selling. The main feature of these models are that they compute a repetition of competitive interactions between agents, through the use of computers to analyze patterns of outcomes that go beyond the purely mathematical findings. Basically, an ABM is composed of a system of agents and the interaction among them. Even a simple ABM may present a complexity in behavior schemes and produce deep insight of the processes of the reality that it simulates. Moreover, agents can unpredictably change their behaviors. For what concern diffusion of innovation, ABMs suit to circumstances in which agents are affected by their social system, thus by what other agents around them do.

The most popular model of innovation diffusion, the threshold model by Granovetter (1978), takes into consideration the interaction between a social value and an individual benefit adopting an innovation. In this model, the social value is directly linked to the share of adopters in the individual's social network, depicting the diffusion as a contagion process (Rogers, 1969). The preassure for adopting an innovation increases when the number of adopters increases. The threshold is the share of adopters in the individual's social system that has to emerge in order to convince an agent to adopt, it is different for different agents, and it may be influenced by many factors: social economic status, education, age, personality, etc. Further, Granovetter links "threshold" with the utility an agent obtain from taking part to a collective behavior or not: with the utility function, each agent can compute his cost and benefit for a specific choice. Moreover, threshold can be modified by changes in the cost and benefit of the behavior, that are affected by a different situation. The distribution of the thresholds outlines the result of the collective behavior.

Adner and Levinthal (2001) used an ABM that take into account the influence of heterogeneity (different consumers with their personal needs) in the demand side of the market on the firms' innovation choices, in order to examine the dynamics of product and process innovation. In their study the computer simulation highlighted the role of "technologically satisfied" consumers in modeling innovation stimulus, and provide insight for a new stage in the technology life cycle characterized by increasing performance at a stable price. They focused they attention to the technology evolution and the link between technology improvement and the demand scenario where the technology is eventually assessed.
Their model is characterized by the diversity held in the concept of "market"demand. Consumers are different and different are their need to be satisfied. The authors defined consumers by two properties: the minimum performance condition that an innovation has to fulfill so that the consumer take into consideration to buy a product, and the consumer's willingness to pay for product performance.
In order to meet market necessities in a heterogeneous demand scenario, early technological development is pushed by a prime stress on product technology to accentuate the features of the technology and allow to satisfy the demand from customers, or on process technology to decrease the price to the level in which users are willing to pay. The subsequent phases of development, after the technology has exceeded market preliminary conditions, technical developments are moved by the willingness of rivals companies to enhance their revenues in the face of satisfied users.
In this phase the there is a new stage in the technology life cycle distinguished by improving performance at a constant product price.

Thus, firms' aim passes from reaching performance increases to encompass the ways in which these increases are perceived and implemented by their users, whose marginal utility from performance improvements has a key role in modeling firms' pricing and development choices.
In order to comprehend the development of product technology, the scenario in which the technology develops has to be determined and customers' willingness to pay for improvements to the product has to be marked out. Moreover, an important element that shapes consumers' preferences in the diffusion of a new technology is the minimum performance threshold, i.e. the minimum level of performance that a product has to present in order to be sufficiently valuable for a specific consumer. Minimum performance threshold however is characterized by heterogeneity between users and their specific willingness to pay. Adoption of a technology and the purchase of a product are a discrete decision incited by the exceeding of some threshold of "attractiveness".

The authors define a consumer's functionality threshold "*as the minimum objective performance (independent of price) that a given product must deliver in order for the consumer to consider it."* Together with this threshold there is a user's utility threshold that determines the maximum price a user would pay for a product that just fulfill his functionality demand. The two threshold considered together allow to take into consideration technology progression in performance and price. A functionality threshold sets the level of performance under which a user will not adopt a product, indipendently from the price: if the product is not above the functionality threshold, for any positive prices, the customer considers it as "junk" and would not buy it. However, since customers are different and have different threshold, depending on requirements and the context, the same product could be suitable for another consumer. .Thus, consumers with the same functionality threshold may have different net utility thresholds.
Differently from the minimum performance threshold, there are no maximum limits to the functionality that a consumer would be willing to accept. However it is possible to say that there is decreasing marginal utility related to an improve in functionality (Meyer & Johnson, 1995). In the same way, consumers are characterized by a positive, but declining, willingness to pay for enhancements that go beyond their need. As a consequence, if users requirements are surpassed, their willingness to pay for enhancements tends to be smaller and smaller until the firms will not be able to receive incentives for other enhancements. Even if for high levels of functionality users do not give much importance to performance differences, they will in any case prefer the more improved technology. As a consequence, in presence of competition, firms are forced to improve functionality, even if such enhancements do not affect consumers' willingness to pay.
Diffusion of innovation models demonstrate differences in adoption rates and decision taking into account demand heterogeneity in explaining the differences in adoption rates and decisions, but they considers diffusion of a fixed innovation, and not consider the interaction between changes in the innovation resulting from further development and consumers' adoption decisions.
Functionality and price do not have to be confused, even if in some context are often coupled because users with high functionality requirements usually purchase more expensive products. If we considers markets for emerging technologies, potential consumers with a high willingness to pay for the product who have low functionality requirements, are determinant in the creation and acceptance of a new technology.

In its 2006 paper, Dawid pointed out the potential of the ABM in the economic context for what concern the study of innovation and technological change. According to Dawid, ABMs are a useful tool to analyze empirical stylized realities, which are not taken into consideration by standard models. Indeed, standard equilibrium models do not explain in a satisfying way numerous empirical stylized facts that in ABMs can come out. In addition, innovation processes are characterized by genuine properties that require not to be modeled by a standard equilibrium model with full rationality, but by ABMs that have the capability to include these genuine properties. Dawid

considers four genuine properties: the dynamic structure of the process of innovation; the knowledge as the main input for the realization of innovation; the uncertainty underlying innovation; the relevance of heterogeneity between firms for what concern knowledge, technology and innovation strategy for technological change. In particular, the author explained that in an industry where there is process of technological change, a strong uncertainty underlying a highly decentralized process is given by several heterogeneous agents that are searching for new products themselves, but are interconnected through market and non-market interactions. As a consequence of this uncertainty and heterogeneity in the market, a theoretical economic model alone is not sufficient, while ABMs are attractive to provide insight of the underlying effects influencing technological change. Thus, the study of the dynamic interaction between heterogeneous individuals whose choices are determined by changing decision rules can be carried out making use of ABMs.

In Deffuant et al. (2005), an ABM to study diffusion of innovation is proposed, in particular concerning the rationality of potential adopters and their behavioral aspects.
The main aspect of the model is that it depicts dynamics of discussions in a social network of interrelated individuals. Those agents exchange messages in the network, concerning their opinion and information. Conversations are provoked by messages from the media that arrive to the agents randomly, with a given frequency; then, they diffuse the conversation in their network and spread information, allowing agents to assess the individual benefits of adopting an innovation.
Another assumption of the model is that individuals from the first time they hear about an innovation, have an a priori opinion on the social value carried by it. The dynamics on the social values are based on the "relative agreement" model, which can lead to polarization under the influence of a minority of extremists when there are a lot of discussions.
Agents with having a high social opinion of the innovation capture the information and use it to elaborate an analysis of their potential individual benefit coming from adoption. Then they share the evaluation to other agents in the network. Adoption occurs only when a global evaluation, including the social value and the individual benefit, comes with some certainty.
The model estimates the average number of adopters for different values of the parameters, together with the a priori distribution of social values and the individual benefit evaluation. The assessment of the outcomes comes from the analysis of the social value distribution and the information possessed after the simulation. Agents that assign a high social value to the innovation are more prone to search for information in order to estimate more accurately the individual benefit of adoption. On the other hand, when the social value of an innovation is low, agents do not take into account information and do not share it. The main outcome is that the probability of succeeding for those agents that give a high social value to innovation and low individual benefit, is greater than for those that assign a low social value and have high individual benefit. This happens because, in the last case, information could not be propagated, thus preventing agents from assessing their individual benefit.
Finally there are cases in which a number of extremists has a very important influence on the propagation of information by polarizing the social value. These extremists are able to modify the adoption of innovations for very high density of the social network and the frequency of discussion. Low levels of adoption can derive also from high uncertainty on the innovation.

The efficacy of ABMs in the context of diffusion of innovation has been also pointed out in Kiesling et al. (2012). According to them, ABMs has received a lot of attention in the last years thanks to the their capability to analyze complex phenomena such as the diffusion of an innovation. This ability is not easily performed by traditional models. ABMs concerning with diffusion of innovation takes into consideration the individual agent and not an entire social system, so that agent's characteristics, such as heterogeneity, social interactions, and decision about adoption, can

be easily modeled. The aggregate behavior of the whole social system emerges as the outfit of the individual behavior and the interactions between agents.
One of the most important characteristics of an ABM is that is explicitly represents consumers' decision making processes, in particular those decision about adopting or not a new innovation. For this purpose, different types of procedures have been realized in order to set up these decisions, from simple rules to sophisticated processes:

- The simplest decision rule is adopting when the first of an agent's neighbor has adopted. This rule is related to a spreading diffusion of information about the innovation.
- After having recognized that agents are heterogeneous and not perfectly informed, adoption decision can be modeled by considering expected utility, representing individual choice decisions.
- Another used representation for adoption behavior is given by dichotomous variable related to individuals' external state: agents can be potential adopters or adopters. Other ABMs instead consider decision making process in a succession of passages between more than two states.
- Other diffusion models consider that consumers create their preferences in a collective process of opinion formation.
- The most sophisticated process regards social psychology approaches, which stand from psychological theories of behavior. In these cases, the decision to adopt is not based on perfect rationality but on psychological.

ABMs are useful because they explicitly take into consideration interactions among adopters, thus modeling social influence in a system. Social influence is an important concept that can be lead on different levels. At the micro-level, it is shared locally through communication channels and word of mouth the most important form at this level. Meso-level social influence is the interaction that originates collectively from an agent's social environment. Macro-level social influence is defined as global interactions at the level of society as a whole.
One negative point about ABMs is that they do not consider competition among technologies. The main part of them take as an assumption that the innovation is not hurt by rivals' offerings and decisions. Instead, in the reality, firms have to cope with fierce competition other products or other firms launching their own products.

PART I: REASONS BEHIND A LOSS

As we have shown in the first chapter, Apple's iPhone is recently facing a decline in market share and in small part also in consumer satisfaction, while having been the most successful device of the last years. In April 2013, Bloomberg Adam Satariano described how Apple's quarterly profit was projected to shrink for the first time in a decade, especially due to its new competitor, Samsung.
Is just a matter of competition the one that led Apple to see its market share decline? We will now try to examine which have been the reasons for Apple losing ground with its iPhones.

1.1) A MATTER OF COMPETITION AND PRICE

Apple's release of the first iPhone was a real revolution in the mobile phone industry, thus disrupting a market. Just after the introduction of its first smartphone model, Apple saw many competitors entering the market with their new phone devices, but it took a few before they managed to give Apple anything to worry about. It is in the last few years that Apple has shown its difficulty to cope with a continuously intensifying competition, since the initial competitive advantages of the iPhone over its rivals started to reveal its weakness and to decline. The fierce competition Apple had to cope with has been led in particular by those devices operating with Android operating system, first of all Samsung smartphones. When the iPhone showed its primacy in the smartphone market, competitors were moved by a sort of "follower strategy", which consisted in an "imitation and improvement" pattern : rivals started to produce and launch models whose design was almost identical to the iPhone's, but improving its main features, such as camera resolution or larger screens, and adding more features compared to the iPhone's offering.
Being a first mover in a new market surely confers advantages:

- strong brand loyalty and technological leadership, since the company that introduces a new technology may earn a long lasting reputation as a leader in that technology domain. And such reputation can help the company sustain its image, brand loyalty and market share even after competitors have introduced comparable products. Being a first mover enables the company to shape customer expectations about the technology's form,features, pricing, so that by the time the competitors enter the market, customer requirements may be well established. Moreover if aspects that users have come to expect in a technology are difficult for rivals to imitate (because for example are protected by patents or copyright), being a technology leader can yield sustained monopoly rents (the ability to set higher prices).
- preemption of scarce assets, for example preemptively capturing the rights to exploit services offered by wireless operators, signing exclusivity agreement with them.
- the possibility to exploit buyer switching costs, for example the initial cost of a good which is itself a switching cost or the cost of the complements purchased for that good. In addition, buyers of a technology spend time to become familiar with it, so the time investment is a switching cost deterring users from switching to a competitor's product.

However, being a first mover also means that competitors can imitate the product offered by the former and its moves or strategic choices. The first entrant in a new market can earn greater revenues, but can also face higher costs: it typically bears the bulk of the R&D expenses for their technologies, while a later entrant can capitalize on its R&D investments. Moreover, the latter can fine-tune the product to customer needs as the market becomes more certain, avoiding any mistakes made by the first entrant and responding faster to changes in the industry or customer preferences.

The main reason why Android phones won market share over the iPhone, apart from being an open-source operating system, is that a lot of device producers (brands) adopted it, which allowed the consumer to have a wide choice in the smartphone market place, thus creating a wide and differentiated consumer base. Moreover, even if for some aspects it has been a win-win partnership, the fact that the iPhone was initially launched with AT&T exclusivity contract in the U.S., actually hurt Apple's potential sales. As a matter of fact, many consumers adopted Android because they could use any carrier they wanted to. At the end the AT&T agreement ended and the iPhone became available everywhere.

Another important feature of the Android phones that was considered a key element to gain shares and consumer satisfaction, especially in the case of the Samsung's offering, was the screen size. With a consumer that was becoming more and more sensitive to the entertainment part offered by mobile devices (such as the possibility to play games and watch videos and movies, but also interacting with people through social networks), a larger screen meant allowing users to have a much comfortable and amazing experience for their amusement purposes. When Samsung introduced its Galaxy S line in 2010, it had a 4-inch screen, while Steve Jobs was refusing to offer a larger iPhone. However, while Apple remained stuck to its limited offering of few versions of its mobile devices, thus targeting with its releases just the high-end segment of the market and consequently setting very high prices for them, Samsung was able to produce and offer also smaller versions of the same device, such as the "Mini" versions of the Galaxy S line. Apart from the Galaxy S line (from the I to the V) that is composed of models that targets the high-end segment of the market, Samsung adopted the strategy of flooding the market with a lots of mobile phones in a short period of time, responding rapidly to market requests and providing different solutions for a myriad of different customers, from low to high-end markets. This means that at least one of the products will, presumably, appeal to a person.
This approach is reflected also in the price of the devices: Android phones average prices is about $200 while for the iPhones it touches almost $600. As a matter of fact, since there is much growth coming from emerging markets, where smartphone ownership is rising, Apple failed to increase its market share there because of the high price of iPhone models. Apple has always distinguished itself for offering quality products sold for higher prices, and not on market share, rather focusing on maximizing profits. However, emerging markets are highly price-sensitive and Chinese smartphone manufactures providing affordable devices are moving rapidly into the competition game.

For what concern the pricing aspect, Apple knows that for some customers being the first to have the new model is quite a honor, while others prefers to wait before switching to the new one. As a consequence the Company prices its products at a higher rate at launch, while quickly dropping the prices within months. In this way Apple can capture as much revenue as possible at the beginning while gaining different segments of customers through price reductions on older models.
A part from offering big discounts on old models, thus receiving a lot of criticism for how high they price their products and then how quickly they drop those prices, Apple has tried to offer a "cheaper" product to the market. With the iPhone 5C, Apple launched a lower priced iPhone (many

view the “C” as a moniker for “cheaper”), which in essence is old technology, similar to the previous iPhone 5, in a plastic case available with a variety of new colors. 5C prices in the U.S. started at $99 on contract and $549 off-contract, $100 less than the more expensive 5S model released at the same time. However, according to research firm Gartner, such small diminution in the price of the new model didn't appeal to the emerging markets: Apple’s colorful plastic phone didn't sold as well as the high-end iPhone 5S (or the discounted iPhone 4S), because early adopters lined up for the fancier model and the iPhone 5C simply was not so cheap in emerging markets like China and India. Moreover, Gartner believed the price difference between the iPhone 5C and 5S in mature markets such as Europe and U.S., where prices are cut by operator subsidies, was not enough to drive users away from the top of the line model.

1.2) A MATTER OF INNOVATION

As I have already pointed out in the second chapter, a part from the first release of the original iPhone, which was considered as a breakthrough innovation in the mobile phone market, the subsequent models developed by Apple did not receive the same extraordinary welcome. As pointed out by Hoeffler in *“Measuring preferences for really new products”* (2003), consumers have different perceptions when the product is a really new product as opposed to an upgrade or new release in which there are few perceived additional benefits. In the updated versions of the iPhone, there were no substantial changes and thus did not motivate or create enthusiasm in their old consumers as the original release had done. The first exposure for consumers to the iPhone device was the haptic communications with the product in the Apple Stores, wherein consumers could touch, play with, and produce an experience with the new device without pressure from sales people. The iPhone was the first mobile phone with a touch screen which enabled this haptic experience. These tactile experiences were important in the decision making process as consumers use their hands to explore and evaluate products based on their material properties prior to making a final purchase. With later releases of the iPhone, the haptic experience was the same as there were no modifications to the touch screen.

In a study published in 2011, called *“How iPhone innovators changed their consumption in iDay2: Hedonic post or brand devotion”*, Emilio J.M. Arruda-Filho and Mark M. Lennon collected data from the website forum Everythingicafe.com (a site that offers a platform for Apple fans to communicate with other consumers who are also passionate about Apple products or are seeking information about them) in order to analyse consumption behavior of iPhone users after their experience with the first iPhone and its successive models, until the release of the iPhone 4. The researchers found that among iPhone users, Apple afficionades, the so called “acolytes”, are prone to purchase a new version for pleasure and loyalty purpose regardless of the perceived technological capabilities of the new device. These are usually the first adopters, who are moved to switch to improved model more for personal satisfaction, desire for new features and brand devotion, than for the real improvements of the new models. By contrast, non-Apple devotees were less satisfied by the new iPhone models, admitting a lack of innovative capabilities: thus they preferred to wait for better prices after obtaining knowledge about competing products. In particular the iPhone 3GS was not seen as an innovative product that could justify a purchase or a switch from the old version.

Even subsequent improvements, like the move to a widescreen display for the iPhone 5, lack the same impact of the first iPhone; upgrades are seen more like obvious next steps, not bold first steps. In a lot of ways, Apple has been acting slowly and too gradually in recent years. Instead, in the Android world, manufacturers are trying everything could be perceived as a strong improvement.
The net result of this is that Apple’s devices are becoming less compelling as time goes on. It still

makes some very attractive models, but they're no longer too much above their competition.

In a 2013 Wall Street Journal's article, the release of iPhone 5S and 5C was welcomed as *"underwhelmed. That, in a word, was the response in many quarters to Apple's rollout of two new iPhones. With the iPhone 5S, the industry's leading smartphone got a quicker processor, better camera and new fingerprint security scanner. With the iPhone 5C, it got less expensive and more colorful"* . And Wired Magazine added that *"though the faster, sleeker, more powerful phone is unarguably cool, the steps forward are still incremental. And incremental isn't what the world expects from Apple."* (CNN.cm, 2013)

According to others "*smartphones belong to a maturing industry, which means that it's going to get harder and harder for any company - Apple, Samsung, or any other would-be challenger- to make a splash."* In other words, competition changes expectations. During its first few years of existence, the smartphone market was basically the iPhone and a just few rivals trying desperately to catch up with the iPhone. Now, even if it still represents the most sold phone ever, the iPhone only accounts a 15% of the smartphones market share, where competition of devices running Google Android has come in a wide range of sizes and styles and proposing a lot of features.(CNN.com, 2013)

The problem with Apple's iPhone is that in the market, once consumers are impressed the first time with a revolutionary innovation, they get used to expect the same impact each time, since after a while a particular feature or a benefit become a "must have" for the whole industry, and it takes very little time until all brands offer that feature or benefit.
In conclusion, we can say that Apple has lost its innovative aura, but according to its top executives the Company, instead of loading up the devices with features the way competitors do, preferred to select a handful of important features and made them work perfectly.

1.3) A MATTER OF LEADERSHIP

Steve Jobs has always been considered one of the main reasons of Apple success, in particular with smartphones and tablets. After his death in 2011, Tim Cook's challenge has been to maintain the momentum at largest and most famous existing technology company, following a decade of changes and innovations with few precedents in corporate history. The 1998-2011 period in the Company's history is seen as a lesson to avoid the so-called "innovator's dilemma". It has become clear that Cook does not have the presence that distinguished Jobs, and a large part of what made Apple so special was not just what products it offered, but also how it made you feel about them. Jobs was a champion at keeping customers on the edge of their seats, arousing their interest and wonder. He was, in practice, the marketing of Apple: his story, his theatrical skills (product announcements were some of the greatest shows on earth) and his attention to detail in advertising created a mystique halo around him able to foster a product of religious intensity.
The shock of Steve Jobs' death was deeply sensed by Apple's super fans, who had largely seen him as the person behind the Company innovative and superior products. Thus, some believe that his death has in some way faded the spirit of new Apple product launches.
This could be one of the reason why a 2012 survey conducted by Strategy Analytics have found that Apple users were no longer as interested in committing to the brand's products in the future as they were in the past. The survey found 88% of existing iPhone owners at that time in the U.S. were willing to buy another Apple's smartphone, while the previous year the study reported a 93% of customers willing to purchase a subsequent iPhone. The decline in Apple loyalty touched Europe, too. The study found that 75% of Western European users were likely to purchase another Apple handset in 2012, while in 2011 they were 88% (Islam, 2012). Together with some dissatisfaction

among customers that were unhappy with the iPhone 5 due to its lack of hardware innovation from the previous iPhone 4S, the loss of the visionary leader could have made some users to switch from a product that was no more perceived as appealing as before.
While the legacy that Steve Jobs left will continue to ripple out into Apple's future, it sounds difficult to argue that today Apple still has quite the same magic without him.

PART II: A NEW PRINCING STRATEGY

In August 2013, Apple launched a new updating campaign in the U.S. to entice old iPhone 4 users to switch to the new iPhone 5. The updating cost was really tempting: customers received a gift card up to $250 to purchase the new version. How did it take place and why? What is the rationale behind this new strategy?

2.1) THE TRADE-IN PROGRAM

The rumors about the new campaign came out in June 2013, before the release of the new iPhone 5C and 5S, when different online sources started taking about a new iPhone trade-in program in stores that would have been announced within few weeks.
The trade-in program was aimed at getting users to upgrade to the iPhone 5 and turn in older models. For this purpose, Apple would have made a partnership with Brightstar Corp, a mobile-phone distributor, to manage the campaign. By offering credit for older smartphones, Tim Cook's aim was to push consumers to upgrade to the latest models, in order to revamp sales growth and contrast declining shares. According to Roger Entner, an analyst at Recon Analytics LLC in Dedham, Massachusetts, the program " *will help them sell more phones, because it will lower the consumer's out-of-pocket expense."* (Bloomberg, 2013)

The launch of the program, eventually, was announced on August 31, 2013. Apple those days told Wired that:

"iPhones hold great value. So, Apple Retail Stores are launching a new program to assist customers who wish to bring in their previous-generation iPhone for reuse or recycling. In addition to helping support the environment, customers will be able to receive a credit for their returned phone that they can use toward the purchase of a new iPhone." (Wired Magazine, 2013)

Apple already provided an online recycling program, offering money to customers for their used devices. However the new trade-in program with BrightStar was available only at Apple's retail outlets, letting consumers receive payments instantly in the form of a gift card. Trade-ins took place in Apple Stores, where employees had been trained for the program, which covered multiple generations of iPhones. According to 9to5Mac (2013), *"Apple Store employees will conduct the trade-in process via the mobile EasyPay devices. A customer can bring in an iPhone 3G, iPhone 3GS, iPhone 4, iPhone 4S, and iPhone 5, and receive a gift card to be applied to a new iPhone purchase"*.
The credit offered was decided on the total condition of the phone being turned in. The new iPhone had to be bought during the trade-in process, and would have been activated on a wireless contract. It was not allowed to get an off-contract full priced iPhone with this trade-in program. While trade-in values changed over time, it appeared that a 16GB iPhone 5 in good condition had a trade-in value of around $250 (Keller, 2013).

This campaign was part of Tim Cook's strategy of getting more customers to buy iPhones directly from Apple, after having noted his dissatisfaction that approximately 80% of all iPhones are not purchased from an Apple Store. When phones are sold by carriers, as is most often the case, Apple

is at a disadvantage. The iPhone is presented as just another smartphone, one of many. But if Apple can control the presentation of their devices, they're more likely to be able to sell one to you.
One of the benefits of an in-store program is that it should incrementally increase store traffic which is always a good situation as it increases the likelihood that the person will buy something. While some people will prefer to use the web to sell their iPhone there will be others that will want to go into a store to make sure it doesn't get lost or pick up a new iPhone immediately.

Until then, Apple had paid little attention to the refurbished iPhone market. However, as Apple's growth had been slowing at that time losing considerable market share from the year before, especially due to the fierce competition lead by Samsung, trade-in programs appeared to be a strategic move in order to support sales of new hardware in mature markets such as the U.S., where many prospective customers already own a smartphone. According to some indiscretions, used iPhones collected in the U.S. could have been resold in emerging markets, where Apple's share was lower and demand for cheap devices was greater, so that the resale of Apple's older models would have not cannibalized iPhone 5 sales in the U.S. Selling used iPhones in emerging markets could have also kept first-time smartphone buyers around the world from committing to Android, buying time for Apple to introduce new models. Apple has had a tougher time in countries such as China and India due to the higher prices of their devices so this is one way to combat lower priced Android phones. This could help Apple manage used devices and margins if it is able to get enough of them. While the prices for the resold iPhones will be lower they will probably be going to customers that would not have been buying an iPhone and Apple has a better chance of setting the price.
The overall impact from Apple's and other companies trade-in programs should incrementally help new iPhone sales as it will provide a way to monetize someone's current iPhone and make it less expensive to upgrade.

It was not a surprise that Apple expanded this policy into stores. Todd Day, senior industry analyst for Frost & Sullivan, said at that time: *"If you look at Apple's overall business model, it's not just about the devices but the overall universe"*. Thus, offering a competitive trade-in program to the ones offered by major carriers and distributors, would have helped Apple to ensure those customers stick around, particularly if they received a gift card instead of cash. There was a lot of competition in the field on trade-in. *"Trade-in programs for smartphones have probably become the biggest, hottest area of smartphone transactions this year,"* said Eddie Hold, vice president of connected intelligence for research firm NPD Group. AT&T, T-Mobile and Verizon all launched early-upgrade programs that summer, relying on consumers trading in old devices. Retailers including Best Buy, Radio Shack and Amazon.com also had trade-in programs, as did manufacturers including Samsung and HTC and resale sites Gazelle.com and NextWorth.com. (CNBC.com, 2013)

2.2) HOW DID THE PROGRAM WORK?

The program worked this way. A customer brought into an Apple Retail Store an any generations' iPhone, which had to power on and not to be liquid-damaged. It was then evaluated by an employee with the help of an online site, BrightStar, through which the company was able to offer Apple real-time pricing information for trade-ins. The employee could access the site using the store's iMacs or iPads Apple's EasyPay terminals, which are essentially iPod touches with credit card readers attached. The customer then had to answer a series of questions about the condition of the device in order to determine a value. This procedure is similar to the way that Apple handled its iPhone recycling program, but the latter can be done by mail only, covers a wide variety of products and is not offered in-store. If a customer wished to trade in an old broken device for which there was no monetary value, they could do so as a simple recycle.

Values could range depending on a variety of factors, including device color, physical damage and liquid damage. Though the prices could very well be tweaked before the program went wide, the range was around $120-200 for 16GB iPhone 4 and 4S models. A 16GB iPhone 5 in good condition could go for around $250, less than it was offered by some of other trade-in sites like Gazelle, Glyde or NextWorth.(Wired Magazine, 2013).
Still the in-store convenience of the program could definitely offer the advantage here. Being able to walk in and get the deal done instead of mailing it off and waiting was a successful point.
Once the paperwork was done, the value was added to a gift card. The balance was applied to a new device, and the customer kept the gift card if there were money left over, while the store kept the old phone. The trade-in program was only applicable if the customer was in the store to get a new phone, not just trade for a gift card.
That value could be used in credit for a new device but only if the customer had an upgrade credit available. So there was a carrier check involved. If a user did not have an upgrade credit, he could presumably pay the early termination fee of his carrier and use the credit towards a new device on another carrier.
Eventually, the traded devices were dropped into a bag and presumably shipped off elsewhere, likely emerging markets, for refurbishment and resale. They were not resold at the store where the trade-ins were being offered.

2.3) A PROFITABLE PROGRAM

Apple choice to allow trade-ins in its own stores in order to increment the volume of iPhone sold by them could also be seen as a strategic decision to move commission payment on the upgrade of a new iPhone from other retailers to Apple itself. In the mobile phone business there are various subsidies to be paid from one agent to the other. Apple obtains a subsidy from the wireless carriers, which agree to sell the phone to the consumer for less than they are paying Apple for it, then recouping the cost from the monthly charges over the life of the contract.
However, a retailers also get a commission from the wireless carrier. What Apple has done with its in-store program is preferentially moving that commission payment on the upgrade of a new iPhone from those other retailers to Apple itself. And since during the trade-in the customer had tp sign a new wireless carrier contract in order to get the credit for the old phone applied to the new one, this resulted in Apple now earning, in its own store, that commission on that new contract.
As a result, Apple could make some marginal wireless sales that it would not have made without this trade-in program, because for trading in an old iPhone it was necessary to sign a new wireless carrier contract through Apple.
The program looked like a drain on Apple’s cashflow. The Company gave discounts on its new device's sale and then carried the risk of price changes before that device could be resold; however, considering the commission from the sale of the new wireless contract, an old phone being traded in to a top-end new wireless contract could generates a commission larger than the credit given for the old phone. So the program could in fact be cashflow positive for Apple (Forbes Magazine, 2013).

2.4) MODELING A TRADE-IN PROGRAM

To encourage old iPhone user to switch to the new iPhone 5 through the trade-in programs described before, Apple decided to “underprice” its new technology offering large discounts on the that, up to $250 for the best condition phones. What was the rationale behind this campaign?
In order to give insight of the pricing strategy followed by Apple, it is possible to study optimal pricing strategies and market share dynamics in a transition from an old and established technology

to a new one, making use of an agent-based model. Recalling the literature introduced in the previous Chapter, where authors proposed ABM simulations in order to give insight about different declensions on diffusion of innovation, a model has been developed by Ca' Foscari's professors Pellizzari, Sartori and Tolotti (2014). In the model, a large population of possible buyers decide whether to adopt or not a new technology taking into account prices, private signal and imitation behavior, while the firm issuing the new technology, as a monopolist, tries to maximize its revenue. On one hand the firm has to forecast demand and, on this basis, decide the optimal pricing strategy to maximize profits. On the other hand, potential adopters form their expectation about the diffusion of the technology, being sensitive to prices, imitation effect and other private signals (their personal view on the technologies). The ABM makes it possible to study emerging equilibria between demand and supply, analyzing revenues, prices and market shares and showing how, depending on the values of the parameters, different results can arise. Imitative behavior and the prices set by the firm are the two main drivers characterizing the outcomes of the model.
Differently from the model developed by Nadal et al. (2005) described in the second chapter, which takes into consideration a one technology and where a unique price is determined, here the model studies two competing generations of technologies, so that the firm has to forecast the adoption rate at the end of the first period, before optimally setting prices for the second period. Since the strength of imitative behavior strongly affects optimal revenues, for certain values the ABM shows that the firm should optimally give away the update for free, maintaining its market share and increasing revenues.

2.4.1) DEFINING THE DEMAND AND SUPPLY

In the model, the *demand* is represented by a large number of N possible adopters, who have to decide whether to buy or not an existing technology. Extending Nadal et al. (2005) model of one-generation technology, this model takes into consideration two technologies that we call T_1 and T_2. Those technologies are not released at the same time, but in two different periods, one following the other, so that T_1 can be bought only in period 1, while T_2 can be bought starting from period 2. As a matter of fact, adopters who have to decide whether to buy T_1 are not yet aware about the existence of the second generation, because only T_1 is available.

During period 1, the agents choose whether to adopt T_1 or not. For each agent, the actions are $a_1(i) \in \{0, 1\}$, for $i = 1,..., N$, where 1 means that the agent i decides to adopt T_1, while 0 means non-adoption. While utility from non adoption is 0, utility from adoption is given by:

$$U_1(i) = - p_1 + qx + \varepsilon_1(i)$$

where $p_1 > 0$ is the price of T_1 and has a negative effect for the consumer due to the cost of adoption; $q > 0$ is the parameter measuring social utility coming from imitation and it is a positive externality given by the share of other users who adopt the technology; x is the expected *market share* for T_1; $(\varepsilon_1(i))_{i=1,...,N}$ are i.i.d. random variables with distribution η, representing an individual noisy term. Each agent compares his own utility of adoption and non-adoption, taking into account costs and social/private benefits.
For N fixed, at least one Nash equilibrium a_1^* exists, which in terms of an equilibrium market share is $x^{(N)} = (1/N) \sum_{i=1}^{N} a_1^*(i)$. If the number of possible adopters goes to infinity, any equilibrium market share x is a solution of the following implicit equation:

$$x = 1 - \eta (p_1 - q x)$$

where solutions depend on the values of p_1 and q. According to Granovetter (1978), in the presence of imitation equilibrium results may be highly sensitive to small changes in the distribution of agents' preferences.

In period 2 a new technology T_2 is launched and T_1 can no longer be adopted, but a T_1 owner can decide to upgrade to T_2. Here we have two different groups of agents: *leapfroggers,* who didn't adopt T_1 in the first period, and *innovators,* already owning T_1.

Concerning leapfroggers, utility from adoption is:

$$U_{02}(i) = - p_{2A} + q\, y + \varepsilon_2(i)$$

where p_{2A} is the cost for buying T_2; y is the expected market share for T_2 and $(\varepsilon_2(i))_{i=1,\dots,N}$ are i.i.d. terms with distribution η, representing random terms related to the second technology. Now y is defined as $y = y_A + y_U$, where y_A and y_U denote, respectively, the proportion of new adopters and updaters in period 2.
Concerning innovators, they have to decide between keeping T_1 or updating to T_2. The utility from maintaining T_1 is U_{11} and is given by:

$$U_{11}(i) = q\,(x - y_U) + \varepsilon_1(i)$$

where x is the market share for T_1 and $x - y_U$ is the proportion of the *aficionados*, those who prefer to hold T_1. The utility from updating to T_2 is U_{12} and is given by:

$$U_{12}(i) = - p_{2U} + q\, y + \varepsilon_2(i)$$

where p_{2U} is the updating cost.
Given the distribution of the noise terms and p_{2A}, p_{2U}, the emergent market share is the solution of a system of two equations. For N tending to infinity, the equilibrium market share y_A and y_U are given by:

$$\begin{cases} y_A = (1 - x)\,[\,1 - \eta\,(p_{2A} - q\, y)] \\ y_U = x\,[\,1 - \acute{\eta}\,(p_{2U} - q\,(y - (x - y_U)))] \end{cases}$$

where $\acute{\eta}$ denotes the distribution of the random variable $(\varepsilon_2(i) - \varepsilon_1(i))$ when agents decide to adopt.

For what concern the *supply*, the firm chooses prices to maximize revenues, in particular p_1 is the price of T_1 and p_{2A}, p_{2U} are the prices of the adoption of T_2 and upgrade from T_1 to T_2, respectively. Thus prices are represented by the vector $\mathbf{p} = (p_1, p_{2A}, p_{2U})$. Once prices have been set, agents form their demand and market shares $\mathbf{m} = (x, y_A, y_U)$ emerge. Total revenues are:

$$\Pi_q(\mathbf{p}, \mathbf{m}) = p_1\, x + p_{2A}\, y_A + p_{2U}\, y_U = \mathrm{p} \cdot \mathrm{m}'$$

where p_1 both determines the revenues of the first period and and shapes the market in the second period.

2.4.2) SET UP AND RESULTS OF THE AGENT-BASED MODEL

For the ABM simulation, parameter q , that is exogenous, assumes all the values in {2.0, 2.1, …, 3.9, 4}. Triplets of prices $\mathrm{p} = (p_1, p_{2A}, p_{2U})$ are chosen, where we have $p_1 \in \{1.00, 1.05, \dots, 1.95, 2.00\}$, $p_{2A} \in \{0.50, 0.55, \dots, 1.45, 1.50\}$ and $p_{2U} \in \{-0.5, -0.4, \dots, 1.4, 1.5\}$. A finite and large population of $N = 1000$ agents is chosen and $M = 50$ different combinations for each of the price configurations are simulated. The model first computes the demand of period one, where agents choose their action according to utility $U_1(i)$ and a market share x^N emerges. Then, in the second period agents are divided into leapfroggers and innovators, according to their choice at period 1, and the outcome is a market share $y^N = y_A{}^N + y_U{}^N$. Supply is determined evaluating the M revenues for each of the price configurations. For any given q, $\mathbf{p}^*(q)$ is the vector at which the median revenues are maximized and the set P_q of price triplets (whose revenues are not significantly different from the revenues obtained with $\mathbf{p}^*(q)$) is formed. The final outcome is a set of optimal prices P_q, market shares and optimal revenues for each value of q.

The main result of the model is that the higher are the levels of q, the higher are the total expected revenues: they are linerarly increasing as imitation increases. Moreover, adoption of T_1 by innovators in the first period brings a major share of revenues, in particular for higher values of q. Revenues due to adoption by leapfroggers in the second period is decreasing with q while revenues coming from those who adopted T_1 in the first period and updated to T2 in the second period (updaters) are small and relatively flat.
For what concern market shares, the share of innovators adopting in period 1 appears to steadily increase with higher levels of q, while the share of leapfroggers decreases with a peak around the value $q \approx 3.4$. Since $y^N = y_A{}^N + y_U{}^N$, if the share of innovators increases, the number of leapfroggers declines. The share of updaters increases with q and peaks at the same *critical value* of 3.4, reaching 20% of the customers' base and then declining for higher values of imitation. The increase in the number of updaters pushes more leapfroggers to adopt, thus expanding the deviation from the declining trend of their share.
For what concerns optimal prices, the price of adoption p_1 for innovators in the first period is constant for $q \leq 2.7$ and increases for higher values of the parameter. The price of adoption by leapfroggers is almost constant for all levels of imitation. Instead, the updating price shows a U-shaped function of q*:* updates are very cheap, around the price of 0, for values of q around 3.4, the critical value. This suggests that it may be optimal to subsidize updates, favoring them with a pricing pricing strategy of massive discounts.
The peak in the share of updaters visible at the critical q is due by low updating prices and this rise in the numbers of adopters of T_2 fosters further adoptions by leapfroggers (who didn't adopt T_1 in period 1).

This last result provides an explanation about the Apple trade-in program that offered owners of the previous iPhone a big discount to push them to switch to the new iPhone 5. When the imitation externality is high (between 3.2 and 3.6), it becomes optimal to give the update for free: as a consequence, adoptions of leapfroggers peak, thus keeping a high market share. Because the price for adoption by leapfroggers remains constant in the same interval of the q, it is better to increase adoptions by pushing old users to upgrade rather then by lowering the price of the new technology for leapfroggers. When q is very high (major than 3.6) it is optimal to increase again the updating price, since the strong imitation effect will sustain new adoption, independently from the price.

2.4.3) DISCUSSION OF THE RESULTS

The model shows that there are value of the imitation parameter for which upgrades should be extremely cheap or even free in order to increase market shares. If we link the model to the case of Apple's campaign, we can imagine the first period as the one in which Apple virtually enjoys a monopolistic position in the market, in particular year 2010 when T_1 is the iPhone 4. The second period is the one in which the entry of a strong competitor forces Apple to change its pricing strategy, so it could be identified as 2012/2013 when T_2 is iPhone 5. The main Apple's rival is Samsung, whose fierce competition in the smartphone market led to the decrease of Apple's market share in that period. Such competition can be shown with a decrease of the parameter q. In 2010, before the arrival of Samsung, Apple has a high value of q, close to 4, because of the strong loyalty of Apple's customers. Thus, Apple is in a leading position and can perform a pricing strategy in which prices are very high, without seeing its revenues diminishing. When then Samsung enters the market in 2012/2013, q falls, for example to $q = 3.5$: Apple has to change its pricing policy in order to maintain its market share and thus makes a strong reduction in the price of the updates. According to the results of the model, the optimal policy is to give away the update for free.

Indeed, Apple decided to launch the possibility to trade in the old models for the new one offering a gift card up to $250. Since the trade-in was possible only signing a wireless contract, and wireless contracts for majors U.S. carriers were offering the iPhone 5 for $199/299 on discount (due to the soon arrival of the new iPhone 5C and 5S), trading in an old 16 GB iPhone 4S in good condition valuated $200 meant to receive a iPhone 5 almost for free.
The campaign was successful because it helped Apple with a 8% increase in unit sales during the quarter of the launch of the program and before the launch of the new models. Revenues increased 7 % in the same period.

PART III: PLANNED OBSOLESCENCE

When Apple launched the iPhone 5C and iPhone 5S in September 2013, a new operating system, iOS 7, was released. The new operating system, however, came with a series of problem spotted by the users of the older models, such as the iPhone 4. Indeed, several of those devices that were upgraded to iOS 7 were made unbearably slow by the new software. Was it a strategy intentionally planned by Apple to pursue its objectives and force users to switch or was it just a technical problem?

3.1) THE PROBLEM WITH iOS 7

In an article published in New York Times in October 2013, Catherine Rampell explained that she had noticed her old iPhone 4 becoming more sluggish around the time the iPhone 5S and 5C were released. The battery was starting to run down much faster, as experienced also by a lot of other users that had previous model devices. As a matter of fact, the new operating system iOS 7 being pushed out to existing users was making older models slow and batteries were drained by it, causing a deterioration in the performances of the devices. The problem could have been overcome by replacing the battery at a cost of $79 or just upgrading to the new iPhone 5C for $99, thanks to the high discounts of the trade-in program that started the previous month. The old users seemed to be in some way forced to upgrade to the new iPhone taking advantage from the further price reduction of the trade-in program. This can be seen as another aspect of the trade-in program implemented by Apple equivalent to a further price reduction for the upgrade, because it additionally increased the cost of not upgrading.
A number of user in forums, blogs and social networks showed their dissatisfaction with that "policy", that was criticized by many as to be a strategic measure implemented by Apple to force upgrading in exchange for the possibility to use the revolutionary and highly expected new operating system. IOS 7, defined by Tim Cook as "*biggest change to iOS since the introduction of the iPhone,"* (Cook & al., 2013) presented a completely redesigned user interface and new features, and was the most awaited upgrade in the history of the iPhone. As a matter of fact, the adoption rate of iOS 7 was reported to be as high as 35% after just one day and in just four days it was installed on more than 200 million devices, which Apple claimed was *"the fastest software update in history"* (Apple, 2013).

A part from the technical problems related to iOS7 on older devices, another negative aspect of the new software was that, few days after the release, Apple started to push out iOS 7 updates to devices automatically and without a users' permission. According to a report published those days by CNET, an automatic software update was being released to iOS 7-compatible devices that did not yet have the new operating system installed (Lowensohn, 2013). As a result, up to 3GB of disk storage was being taken up on those devices. For users who owned an iOS device with just 16GB, this was a big deal, also because this space could not be recovered as the update file could not be deleted (Wolfe, 2013).
CNET studied the situation on an iPhone 4 running the latest version of iOS 6 before iO7 was released. According to their findings, some applications were not compatible with the new software, and users on older Apple devices, particularly the iPhone 4, were facing sluggish performance after upgrading.

A study conducted by Arstechnica in September 2013 made evident that iPhone 4 was truly hit by this slowdown caused by the installation of iOS7 (Cunningham, 2013). According to it, the old hardware was incapable of supporting new features and the device chip was not powerful enough to offer a good experience. The iPhone 4 is the last device produced that is composed of Apple's A4 chip, which is much slower than the new chips on the newest iPhones. In the study, a number of application in both iOS 6 and iOS 7 were launched and timed on a iPhone 4, to see if there were any slowdowns. They measured the time between when the application icon was tapped and when it became ready for being used; each application launch time was measured three times and averaged. The apps were force-quit using the iOS multitasking interface between runs. Also the time it took for the phone to cold boot to the lock screen was measured.

Differences in performances between iOS6 and iOS6 on an iPhone

Application	iOS 6.1.3	iOS 7.0 GM
Safari	1.13 seconds	2.05 seconds
Camera	1.9 seconds	2.63 seconds
Settings	1.31 seconds	1.88 seconds
Mail	1.0 seconds	1.50 seconds
Messages	1.57 seconds	2.80 seconds
Calendar	1.23 seconds	1.78 seconds
Phone	0.67 seconds	2.37 seconds
Cold boot to lock screen	31.14 seconds	45.13 seconds

Source: Arstechnica.com

Result showed that every application was slower with iOS 7 compared to the iOS6 performances, usually by one to one-half second or more. These relatively small delays could aggregate so that a lag could become a significant slowdown.

The release of iOS7 with the problems it carried to older device has found different explanations. For some, it was a strategic move acted by Apple in order to force users to switch to new models and reach the maximum rate of adoption for the new operating system. The supporters of this explanation leveraged on a conspiracy theory, accusing Apple of being guilty of "planned obsolescence". For others, this was not a measure intentionally planned by the Company to reach its goals, but simply a matter of new technologies being not compatible with older ones. I will provide some in-depths about these two perspective in the following paragraphs.

3.2) THE CONSPIRACY THEORY

Several times analysts and users on the Internet have noted that breakdowns in older Apple devices can often correspond to the periods in which upgrades are launched to the market. In their opinion, this is an evidence of "planned obsolescence."
The term concerns with the strategy of planning or designing a product and programming or limiting its useful life, so that after a certain period it will become obsolete, no more trendy or no

functional. The reason for this policy is to sustain long-term sales volume as a consequence of a contraction in the replacement cycle, that is the time intermediating repeat purchases.
Following this strategy, firms aim to earn an extra profit coming from incremented sales, which is believed to fully compensate and exceed the supplementary R&D and opportunity costs of existing product line cannibalization. However, this strategy could be hazardous when competition is high, since customers could prefer to buy firm's rivals products.
In order to originate a planned obsolescence, a firm needs to know that the customer for some reason will probably replace its old product from it. Planned obsolescence is created from the fact that the firm is aware of the planned product durability, while the consumer is not informed about that. So there there is an information asymmetry between the two agents.

For what concerns Apple, the release of iOS7 and the consequences it had on older models could be evidences that the Company engaged a“planned obsolescence” strategy. The iPhone 5S and 5C models came out together with iOS7, which made the iPhone 4 and 4S very slow. Moreover, the battery, which has a limited number of charges, was running down much faster the iOS7 release. Since replacing the battery, which is not replaceable by customers themselves because it is sealed into the phone body, would have cost $79 and $99 was the price of the new iPhone 5C on contract, it seemed that forcing to upgrade was intentionally planned by Apple. Having a sluggish phone with a new operating system make it less attractive and push users to upgrade and “restore” their lost satisfaction (Rampell, 2013).
For those who sustain this theory, Apple has always been practicing this strategy and in a saturated market such is the smartphones' one in the U.S., it is clear that if the iPhones were designed to last for many years, existing users would not buy the new models. Moreover, a limited product durability could be positive for consumers, that are exposed to innovations and are more likely to adopt the new ones. However, if consumers can find in the market a variety of substitute products, planned obsolescence could not be the right strategy. When Apple launched the first iPhone, there was almost no competition in the smartphone industry, so that is was reasonable and favorable to decrease the lifespan of the iPhones without being threatened by rivals' response. Apple had high market power and strong incentive to employ planned obsolescence, because customers had few choices among smartphones. However, with the continuously growing competition from Android devices and the emergence of new brand smartphone manufactures especially in China, planned obsolescence should not be the right move. Taking also into account that consumers are rational and price sensitive, they could easily switch to competitors' products if they find no more justification for having an expensive device that performs under expectation.
Moreover, planned obsolescence can be a successful move also with products for which consumers have large switching cost. As a matter of fact, if consumers possess an iPhone, they may also have bought related products, like applications, that are not transferable on competitors' devices. Furthermore, they may have a number of friends owning an iPhone, so that they could use Apple's messaging applications that are free instead of paying for texting. All of this aspects create an incentive for Apple to push users to upgrade to new models by making the older ones less functional.
However, if we take into consideration that at the beginning Apple offered huge innovations with its iPhone models without the need of degrading the older ones, upgrading to new versions was something natural and obvious, since improvements were so irresistible for existing users that they would have purchased the new iPhones without even realize if their old model was still functional in any case. However, since Apple began to focus more on incremental and sometimes very slight innovations with its last releases, especially the iPhone 5S and 5C, consumers willlingness to naturally upgrade to the new iPhones has decreased. They prefer being certain that their actual model will continue working properly even when new models are released. Employing planned obsolescence in a context like this would not be a successful move for Apple, since it might lose

part of its loyal user base and also its reputation.

3.3) A MATTER OF TECHNICAL IMPROVEMENTS

The debate over Apple's employment of a planned obsolescence strategy has found also supporters of other explanation for the sluggishness caused by the new software. For them, the fact that an iPhone 4 was becoming slower with a new OS was just a matter of technological advances, because if the Company had made possible that all the phones could run the latest versions of a software, this would have never improved and innovations would have never being created. Running a more powerful and sophisticated software such as iOS7 on an older chip inevitably leads the old model to slow down. The A4 chip of the iPhone 4 is not capable of running iOS 7 properly and this is a matter of new software in an old hardware. The fact that Apple, knowing this incompatibility, chose to release the OS also for older devices could be justified by the fact that the Company believes that doing so the value of an old device increases: an iPhone that is frequently updated is more valuable than one that is rarely or never updated and this allow to enlarge the base of loyal customers and updaters, too. Furthermore, getting the latest version of iOS in older devices is also a question of security: iOS is a security-first operating system. Apple has always aimed at keeping iPhone users safe from common forms of attack, but since there will always be new ones, getting updates out in a short period of time for as many devices as possible is highly important in order to maintain this security.

Another explanation for older iPhones' slowness with iOS7 is that components degrade over the time and batteries have a finite number of charges. The fact that they are difficult to replace can be attributed to Apple’s commitment to design and if the Company expects users to want to upgrade within a couple of years, it does not have sense to offer a much durable battery. Moreover, since 90% of iPhone users have the newest OS, while, for example, just 18 % of Android users have it on their smartphones, it is natural and clear that any slowdown from a new OS would be bigger for iPhones.

As a matter of fact, Apple has no incentives for employing a planned obsolescence with its iPhones: deliberately slowing down older phones does not mean giving incentives to customers to buy the new models, but to buy those of the competitors. The iPhone is considered as a premium quality device able to provide the best experience to its customers, so Apple could not degrade its product without suffering a loss in its reliability and image.
We do not know if this slowdown of older models was a strategic move of Apple or not, but surely it represented an additional incentive to upgrade from an older iPhone to the newest, since the cost of keeping the former was further increased by those events.

CONCLUSIONS

The present study has tried to highlight and provide insights about the strategy engaged by Apple with its iPhones both in the period of non-competition with other smartphone manufacturers, which started with the launch of the first model, and after the new entrant in the smartphone industry changed the rules of the game and forced Apple to reconsider its strategy, in particular for what concerns the pricing policy.

Taking into consideration the years when Apple was the only and uncontested leader in the smartphone market, that goes from 2007, when the first iPhone was launch, to 2012-2013, when competition especially from its prime rival Samsung began to be fiercer, we showed that the Company has laid the foundations of its success counting on the development and the release of a revolutionary device that would have reinvented concept of phone for the rest of the following years. The iPhone has reconfigured the whole smartphone industry and helped Apple to become one of the most valuable companies in the world.

As we pointed out, the main reasons for iPhone's success were, first of all, the product itself. Apple developed a completly different device compared to the ones that were available in the market at that time, enhancing both the quality of the materials and the unique and attractive design that distinguished it from those of other manufacturers. Moreover, it presented completed new features and an easiness of use that was not typical of the handsets offering of that time. Providing a platform that was proprietary by adapting its computer operating system to run on the iPhones, Apple offered to its customers a unique and continuous experience, creating a perfectly working ecosystem in which each device could easily and properly communicate with the others.

The iPhone came as an innovation that disrupted entire industries: not only the mobile phone one, but also the music and PDAs ones. Apple has always focused its attention on improving features and adding functionality in order to readily satisfy customer needs, enhancing the quality of the iPhone each time a new model was being developed, in a continuous improvement process. Since Apple focused its control on the parts of the value chain where it has core competencies, controlling and coordinating them while leaving the other areas to organizations with specific competencies, it was able to provide a better and each time improved product to its customers

Thanks to its high quality products, Apple was also able to built and developed its image and reputation all over the world, representing for many a symbol of wealth and high social status. The iPhone managed to capture a loyal customer base thanks to the rich and complete experience it offered to users, by also providing amusement and entertainment applications such as games. This led to the construction of a large and loyal customer base, which became so strong that about 60% of users shows a “blind loyalty” to Apple and are ready to purchase the latest iPhone model.

It success with the strategies implemented, from the product level to the pricing policy implemented, led the iPhone to be widely adopted among an always greater number of consumers, with a constant and sustained growth in the sales of all models, in particular during the period just subsequent to the new releases, and increasing market share until 2013. Moreover, since its first release, the iPhone has always performed as the highest in consumer satisfaction for smartphones, beating the competition of all the other manufactures, from RIM to Samsung.

However, during the study, we figured out that at some point something started two change. Between the year 2012 and 2013, Apple faced a decline in its global market share and a diminishing satisfaction of its customers, even though sales in volume continued to rise year by year. We pointed out that the main reason for this loss was competition. It was just in the last few years that Apple has shown its difficulty to cope with a continuously intensifying competition, led in particular by those devices operating with Android OS, first of all Samsung's smartphones. Moreover, competition touched also the prices of the models: the high prices of the iPhones were contrasted by the medium and more differentiated prices of the other producers, where for example Android phones' average prices was about $200 compared to the iPhones' $600.

Another reason for the iPhone's decline in market share is that while the first release of the original iPhone was considered as a breakthrough innovation, the subsequent models did not receive the same extraordinary welcome, because in the new versions of the iPhone, there were no substantial changes from the previous ones and thus did not motivate or create the same enthusiasm in its old consumers as the original release had done. Moreover, for many people Steve Jobs' death has in some way faded the spirit of new Apple product launches, thus further reducing the enthusiasm.

After explaining the reasons behind Apple's loss in its primacy, we tried to understand what was the response of Apple to this situation. The strategy that the Company pursued to face the fierce competition was a new pricing policy launched in August 2013 in the U.S., that consisted in a trade-in program in order to get users to upgrade to the new iPhone 5 and turn in older models, in change of an up to $250 gift card. With the help of an agent-based model, we provided insights about the trade-in program that offered substantial discounts to previous iPhone users, finding out that there is a rationale behind it: according to the model, when the externality (precisely, the imitation effect) is sufficiently high, it becomes optimal to give the update for free, thus increasing market share. Moreover, the new campaign came also with the release of the new iOS7, that was the cause of several slowdown of older iPhones and thus was seen as a further push to upgrade to the newest models. It is not clear if this was a strategic move performed by Apple to force users switching or if it was just technical incompatibility, but the sure thing is that this was an additional reason to upgrade to the new iPhone model.

In conclusion, we realized that Apple strategy over the years has been successful in most of its aspects, but since competition in the smartphone industry has strengthened, Apple needs to pay attention to its moves if it wants not to lose further market share. Apple should focus on developing new innovations rather than slightly incrementing the extisting ones, in order to offer customers new product experiences and revamp their value propositions. Since consumers are not willing to pay for something they perceive as “the same old thing”, Apple needs to show them that it has not lost its innovative edge, even in a market where competition leave little room for being totally revolutionary.

Moreover, in my personal opinion, Apple should not only concentrate on profits but also on quantity. It is true that sales of the iPhones increase quarter by quarter, year by year, but the Company has to take into account that there is a new scenario, represented by the emerging markets, where might not be so profitable to sell high-end devices for such high prices: emerging market like India and China are fast growing and own technical capabilities and knowledge that can rapidly arrive to compete with the biggest companies in the smartphone industry. They are able to provide good quality devices at prices that are much lower compared to the iPhones. And since lowering its prices would mean maybe losing its exclusiveness halo and thus affecting its brand image, a good solution should be developing and selling a cheaper version of the iPhone that could

appeal also to the medium customer. This could help to win market share in those countries where saturation level is still very low, differently from more mature market like the U.S., and thus enlarging the customer base also there. This may be a strategic move if Apple do not want to stop its growth and is willing to play in those markets.

REFERENCES

ACSI, *"Customer Satisfaction Benchmarks"*, 2013

ACSI, *"Samsung Beats Apple in New Smartphone Customer Satisfaction"*, ACSI Press Release, 31 July , 2013"Smartphone Brands 2013

ACSI, "Smartphones Customer Satisfaction Study" 2013

ACSI, *"Telecommunication and Informations Report"*, 2014

Adner R., Levinthal D., *"Demand heterogeneity and technology evolution: implications for product and process innovation"*, Management Science, 2001

Apple, "*Apple Annual Reports"*, Apple.com, 2007-2014

Apple, *"Apple Press Release: Thanks a billion"*, 2009

Apple*, "First Weekend iPhone Sales Top Nine Million, Sets New Record",* September 23, 2013.

Apple, *"Retina HD display. Not just a bigger display. A better display",* Apple.com

Arruda Filho E., Lennon M. M., "*How iPhone innovators changed their consumption in iDay2: Hedonic post or brand devotion"*, 2011

Baldwin R., *"This is how Apple's new trade in program works"*, Wired Magazine, August 30, 2013

Bass F., *"A new product growth for model consumer durables",* Management Science, 1969

Bass F., "*Comments on 'A new product growth for model consumer durables'",* Management Science, 2004

Baxter K., *"Apple's Mobile Future: Corporate and Business Strategy"*, TightWind.net, June 16th, 2010

Burrows P., *"Apple said to start iPhone trade-in program in stores",* Bloomberg, June 7, 2013

Canalys, *"Smart mobile device shipments hit 118 million in 2007, up 53% on 2006",* News release, February 5, 2008

Christensen C., *"The Innovator's Dilemma"* , 1997

Cue, E., Cook T., Federighi C., Ive J., et al., *"WWDC 2013 Keynote"*, Moscone West, San Francisco, California, June 12, 2013.

Cunningham A., *"New lease on life or death sentence? iOS 7 on the iPhone 4"*, Arstechnica.com, September 18, 2013

Collis D.J., Montgomery C.A., *Corporate Strategy* , McGraw-Hill, 1999

Dawid H., *"Agent-based models of innovation and technological change"*, 2006

Deffuant G., Huet S., Amblard F., *"An individual-based model of innovation diffusion mixing social value and individual benefit"*, American Journal of Sociology, 2005

Etherington D., *"How Apple played it smart with iphone exclusivity?"*, Gigaom, Semptember 22, 2011

Funk J., *"The Mobile Internet Market: Lessons from Japan's i-mode System",* 2000

Gartner, *"Market Share Analysis: Mobile Phones, Worldwide, 4Q13 and 2013"*, 2013

Gartner, *"Annual Smartphone Sales Surpassed Sales of Feature Phones for the First Time in 2013"* Press Release, February 13, 2014

Granovetter M., *"Threshold models of collective behavior."*, 1978

Gross D., *"Internet, Wall Street unimpressed by new iPhones",* CNN, September 12, 2013

Grant K. B., *"Apple's iPhone trade-in program to add consumer choice"*, CNBC, August 29, 2013

Gurman M., *"Apple confirms Apple Store iPhone trade-in program has launched today",* 9to5Mac, August 30, 2013

Krishnan T., Jain D., "*Generalized Bass Model",* 1994

Hoeffler S., *"Measuring preferences for really new products",* 2003

Hof R., *"Samsung Smartphones Edge Apple's iPhones In Customer Satisfaction Survey"* Forbes Magazine, 2013

IDC, *"Worldwide Smartphone Shipments Increase 25.2% in the Third Quarter with Heightened Competition and Growth Beyond Samsung and Apple"*, Press Release, October 29, 2014

IDC, *"Worldwide Quarterly Mobile Phone Tracker"*, October 29, 2014

IDC, *"Smartphone OS Market Share, Q3 2014",* 2014

Information Today 24, *"Iphone tops 1 millionth sale"*, no. 9, 2007

Islam Z., *"For the first time ever, iPhone owner loyalty declines"*, Tomshardware.com, November 4, 2012

J.D. Power and Associates, *"J.D. Power and Associates 2007 Business Wireless Smartphone Customer Satisfaction Study"*, 2007

J.D. Power and Associates, "*J.D. Power and Associates 2008 Business Wireless Smartphone Customer Satisfaction Stud,* 2008

J.D. Power and Associates, "*J.D. Power and Associates 2009 Wireless Consumer Smartphone Satisfaction Study-Vol.2",* 2009

J.D. Power and Associates, *"J.D. Power and Associates 2010 U.S. Wireless Smartphone Customer Satisfaction Study-Vol. 2",* 2010

J.D. Power and Associates, *"J.D. Power and Associates 2011 U.S. Wireless Smartphone Customer Satisfaction Study-Vol.1"*, 2011

J.D. Power and Associates, *"J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study -Vol. 1"*, 2012

J.D. Power and Associates, *"J.D. Power and Associates 2012 U.S. Wireless Smartphone Customer Satisfaction Study -Vol.2"*, 2012

J.D. Power and Associates, *"J.D. Power and Associates 2013 U.S. Wireless Smartphone Satisfaction Study-Vol. 1"*, 2013

J.D. Power and Associates, *"J.D. Power and Associates 2014 U.S. Wireless Smartphone Satisfaction Study-Vol. 2"*, 2014

Jiang Z., Jain D.C., *"A Generalized Norton Bass Model for Multigeneration Diffusion"*, 2012

Jobs S., *"Presentation of the iPhone"* , Macworld Convention, San Francisco, January 9, 2007

Johnson E., Meyer R., "*Empirical Generalizations in the Modeling of Consumer Choice"*, Marketing Science, 1995

Keller J., *"iPhone trade-in program official, starts today",* iMore.com, August 30, 2013

Kiesling E, Gunther M., Stummer C, Wakolbinger L.M., *"Agent-based simulation of innovation diffusion"*, 2012

Laugesen J., Yuan Y, *"What factors contributed to the success of Apple's iPhone?"* Ninth International Conference on Mobile Business, 2010

Lowensohn J., *"iOS6 hodouts complain about large, unwanted iOS7 downloads"*, CNET.com, September 25, 2013

Mace M.,*"European vs. American mobile phone use"* , MobileOpportunity Blog, 2006

M:Metrics, "*iPhone Hype Holds Up"* , MarketWire.com, Press Release, 2008

Maier A., Muller V., *"Apple secures Europe iPhone revenue deals"*, Financial Times, August 21, 2007

Mintzberg H., *"Patterns in Strategy Formation"*, Management Science, September 1978

MIT, *"Cell Phone Edges Alarm Clock as Most Hated Invention, Yet One we Cannot Live Without"*, Lemelson-MIT Invention Index Survey, 2004

Mourdoukoutas P.,*"Can Microsoft Adopt Apple's Business Model?"* Forbes Magazine, October 10, 2012.

Nadal J., Gordon D., Vannimenus J., *"Multiple equilibria in a monopoly market with heterogeneous agents and externalities"*, Quantitative Finance, 2005

Nielson S., *"Apple's premium pricing strategy and product differentiation"*, MarketRealist.com February 6, 2014

Norton J.A., Bass F.M., *"A Diffusion Theory Model of Adoption and Substitution for Successive Generations of High-Technology Products",* Management Science, 1987

Norton J.A., Bass F.M., *"Evolution of technological generations: the law of capture"*, Sloan Management Review, 1992

Pegoraro R., *"Even the best of the phone-PDA combos aren't good enough"*, Washinton Post, January 27, 2002

Pellizzari P., Sartori E., Tolotti M., *"Trade-in programs in the context of technological innovation with herding"*, 2014

Rampell C., *"Craking the Apple trap"*, The New York Time Magazine, October 29, 2013

Rogers E., *Diffusion of Innovation*, 1962

Rubicon Consulting, *"The Apple iphone: Successes and Challenges for the Mobile Industry. A Study of iPhone Users*", Rubicon Phone User Survey, 2008

Satariano A., *"Apple profit probably fell amid growth slowdown for iPhone"*, Bloomberg.com, April 22, 2013

Schilling M.A., *"Strategic Management of Technological Innovation"*, 2010

Sparkes M., *"iPhone owners admit having 'blind loyalty' to Apple",* The Telegraph, Feb 12, 2014

Strategy Analytics, *"Android Captures Record 85% Share of Global Smartphone Shipments in Q2 2014"*, Press Release, July 30, 2014

VanAmburg, *"Samsung Smartphones Edge Apple's iPhones In Customer SatisfactionSurvey"* Forbes to Forbes Magazine, July 31

Vogelstein F., *"The Untold Story: How the iPhone Blew Up the Wireless Industry",* Wired Magazine, 2008

West J., Mace M.,*"Browsing as the killer app: Explaining the rapid success of Apple'siPhone"*, Telecommunications Policy 34, 2010

West J., Mace M., *"Entering a Mature Industry Through Innovation: Apple's iPhone Strategy",* Proc. Druid Summer Conference, 2007.

Worstall T., *"Apple's Very Clever Trick With The iPhone Trade-In Program",* Forbes Magazine, August 31, 2013

Wolfe B. M., *"Apple Is Automatically Pushing Out iOS 7 To Holdout Devices",* Appadvice.com, September 26, 2013