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SMARTPHONE INDUSTRY: THE NEW ERA OF COMPETITION AND STRATEGY

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ABSTRACT

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The thesis aim was to give a quick glance at the smartphone industry start with the history of mobile phone, all the changes it had to go through to reach the modern form of smartphone. Then, afterwards, competitions between companies and smartphone brands are analysed and the outcome was also stated very clear in the thesis. The future generation of this industry was also mentioned based on expertise opinions and real statistics.

A survey about smartphone using was carried out by the author in order to get better understanding at customer satisfaction and brands popularity among a limited number of users. Through online survey, 20 international student has joined to respond the survey. The result was then carefully analysed based on the numbers and theories author has mentioned in the previous chapters of the thesis.

Key words
Competition, operating system, smartphone, strategy

CONTENTS

1 INTRODUCTION

Smartphone, a device which is no longer a strange thing to majority of people since it has gradually entered people everyday life. Smartphones are mobile phones with computers abilities and internet search, the only difference could be the size and its mobility. In another word, it has become a source of entertainment, a communication tool, a search engine and so much more. This has led to the decision of choosing smartphone industry as the main topic for this thesis. But smartphone itself is not appealing enough since smartphone is just another artificial item.

However, the brand and the owners are far more tempting. Same device, similar features but each kind has its own operating system which leads to different experience. Some are opened and everyone can use, some are closed which means much higher privacy for users but not everybody can use it. Nevertheless, each brand has its own history, and it is the history development that is the most fascinating. How the brand was born, what innovation it had to go through, what kind of strategy the company chosed to compete with each other… all led to very different outcomes.

To begin with, the thesis will give a quick glance at the evolution of mobile industry so that readers can have better understanding of how it started, what phases it had gone through. The next chapter will deal with the modern form of mobile phone: smartphone. At this chapter, strategies of different brands will be revealed and compared. The fourth chapter is the outcome which leads to different fades for different brands. The last chapter is about the future generation of smartphone based on facts, analysis and expectations from users and expertise. And lastly, the thesis will end with a survey in order to have more information about the popularity of smartphone brands as well as users satisfaction with each brand.

2 EVOLUTION OF MOBILE INDUSTRY

2.1 History of mobile phone

March 10, 1876 is considered as a milestone marking the advent of the telephone. The father of the first telephone was Alexander Graham Bell. The rudimentary machine can transmit voice has open a new era of development in the history of communications, replacing the telegraph. 1967, the handset called Carry Phone which was considered to be the first "mobile" was released, however, this device was very cumbersome to move because it weighed 4.5 kg (Randy, 2011).

Mobile phone was officially launched on April 3, 1973, named Motorola Dyna Tac, which was invented by inventor Martin Cooper. Motorola Dyna Tac had the same shape as today's mobile phones, although it was quite bulky with weigh more than 1 kg and not popular (Richard, 2015). Since then, the mobile phone development has constantly evolved towards and has become more compact than its ancestors ever were by increasing integrated and more functional rather than merely texting and calling.

In 1991, the second generation (2G) cellular technology was launched. A Finnish company when it was Radiolinja has the slogan: "Finns can call longer" (Biju and Nauman 2014). This tagline implies a limit on the time of the first-generation mobile phone. The period since 2001 is the 3G technology has prevailed. By the year 2009, the demand for mobile users is increasing and they require high quality and high speed, is a prerequisite for the introduction of 4G technology. 4G has the advantage of speed Internet access as well as faster application of advanced multimedia.

In 2008, it is estimated that there are just two people who own a mobile phone. From 1990 to 2011, the number of mobile subscribers on a global scale increased from 12.4 million to more than 6 billion subscribers. Not just increase the number of users, mobile phones also witnessed a change in design and functionality, based on advanced technology. 1973 is a high-priced

phone, fewer features, big and heavy, but by 2013 - after 40 years - the phone was a lot cheaper, it is the equipment needed by anyone, small, lightweight, thin more and more features.

2.2 The first generation of mobile phone

The first smartphone came out 20 years ago, (date 11/26/1993) in COMDEX fair in Las Vegas (USA), IBM had launched a phone called the IBM Simon, or also known by the code name Angler. Despite being a mobile phone, the size of this phone was being equivalent to the Nexus 7 tablet today. With a weight of nearly 0.6 kg, it was easy to see that the user was not comfortable to carry it around. Equipped with 16MHz processor speed, 1MB of RAM and 1MB of hard drive storage, liked smartphones today, Simon was also equipped with a large touch screen 4.5-inch, stylus writing support. But the difference was that the touch screen on Simon was monochrome display and only worked on the operating system which was a variant of DOS called ROM-DOS (Julian 2015).

In terms of features, Simon could be used to make calls, send and receive emails and even be used to send or receive faxes, something that today's smartphones cannot. Besides, it was equipped with applications such as address book, calendar, calculator, world clock, handwriting recognition on the touch screen. Users could even download and install additional applications from 3rd party developers, similar to today's smartphones. Although Simon was launched in 1992, however until 8/1994, this smartphone was officially available on the market. At that time, the price of the product was not cheap at all, 900 USD together with 2-year contract with BellSouth Cellular network (Andrew, 2012). However, it was undeniable that Simon is the forerunner of today's smartphones, though the concept of "Smartphone" premiere hadn’t appeared at that time, however, the world has admitted that Simon was the first smartphone. Above all, the launch of Simon was a great example to show the how fast has technology developed just in the last 2 decades.

Palm was one of the names that brought up the smartphone concept. The first Pilot Devices 1000/5000 was debut on March 1996, three years after Apple launched the Newton Message Pad which attracted attention, but not successful in the market, Palm (at that time part of the

U.S. Robotics separated) began to market PDA (personal Digital Assistants - personal assistive devices). Pilot 1000 was sold for $ 299 USD have 128 KB of memory, together with 512 KB of memory Pilot 500 (369 USD) were the first two models having a gray shell design, the same basic design of current products. The duo had a screen resolution of 160 x 160 pixels, using the device to sync with Windows (version 3.1 or 95) and two AAA batteries for operation from a week or more. But those two are no longer present in the market and become "antiques" but they are the main characters which paved the way for the revolution of smartphones (Yardena 2009).

In 1999: Ericsson R380 - the first smartphone officially unveiled. R380 users did not need to carry multiple mobile devices since all these devices were encapsulated in this small phone. Connected in over 120 countries internationally in 5 continents through WAP services provided Internet information. With this mobile phone, users could contact and work anywhere, at any time. With a touch screen and graphical richness, it provided organizational skills and personal contacts, and WAP services on R380 enabled users to receive or send email, or visit their Web sites or even get information about weather forecasts, flight information and updates about life as sports news, traffic information ... R380 uses the Symbian operating system, a system designed specifically for wireless communication devices.

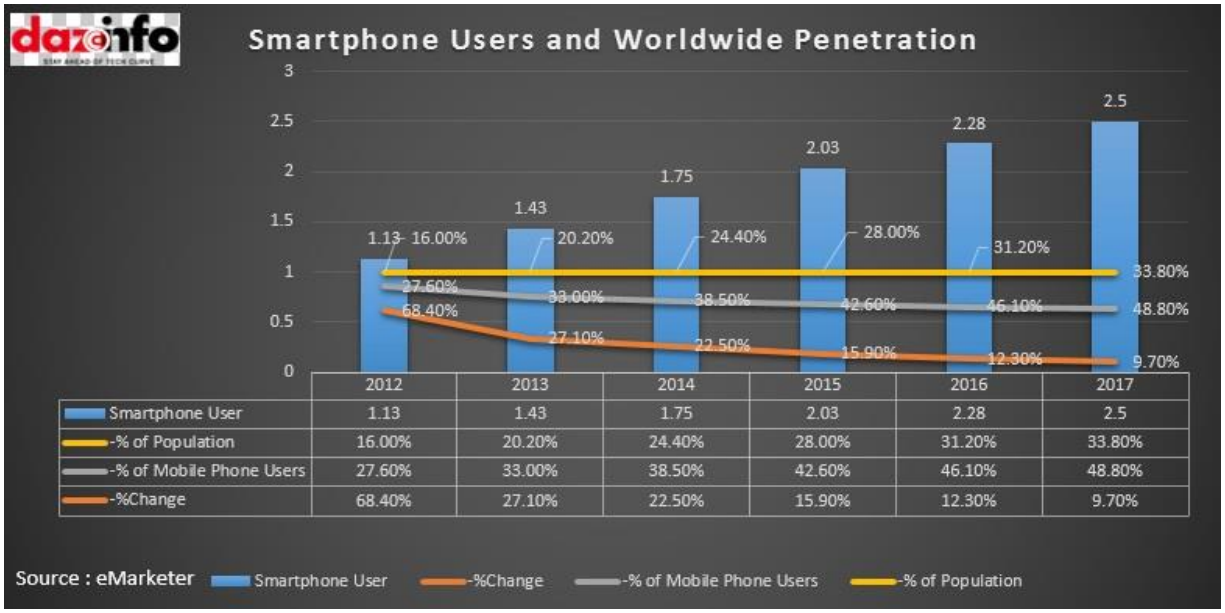
BlackBerry 5810 - Email & surfing capabilities was introduced in 2002. BlackBerry joint smartphone markets with 5810 devices which allowed users to send emails and surf the Internet. Before RIM released a new line of phones running BlackBerry 10 operating system, an expert on mobile devices Sascha Segan has reviewed the landmark models of this label, marking a certain number of changes in functionality and design, not necessarily the most successful products, like Z10 was BlackBerry first device but it was not the most successful one.

2.3 New era of smartphone

The real smartphone is said to be in 2007 when Apple revealed IPhone. At that time, Android was growing and becoming one of the most attractive foundations... Android continues to expand; the platform met a lot of support from manufactures. However, with the advent of the

Apple iPhone, everything seems to change forever. From 2008 - 2012: Android dominates smartphone market since the operating system was most widely used for smart phones was Symbian, but at this point Google has introduced Android, an open source phone operating system that has dominated the entire mobile phone market so far, not only mobile phones but also for many other products. According to information provided by Google on 22/09/2012, more than 500 million Android devices are used every day (Arun 2013). Last but not least, Windows 8, mobile phone integrates cloud storage remotely. The goal is to keep your data in sync between customer's mobiles and computers. According to the predictions of experts in technology, perhaps 2013 is the year of Windows Phone.

In today's technological era, the smartphone is not only growing in popularity but also gives people a series of new possibilities in all fields such as information exchange, mobile working, entertainment at anytime, anywhere. According to a survey, the global smartphone audience had surpassed the 1 billion mark in 2012 and will total 1.75 billion in 2014. Experts expects smartphone adoption to continue on a fast-paced trajectory through 2017. Nearly two-fifths of all mobile phone users—close to one-quarter of the worldwide population—will use a smartphone at least monthly in 2014. By the end of the forecast period, smartphone penetration among mobile phone users globally will near 50% (Greeshma 2014).



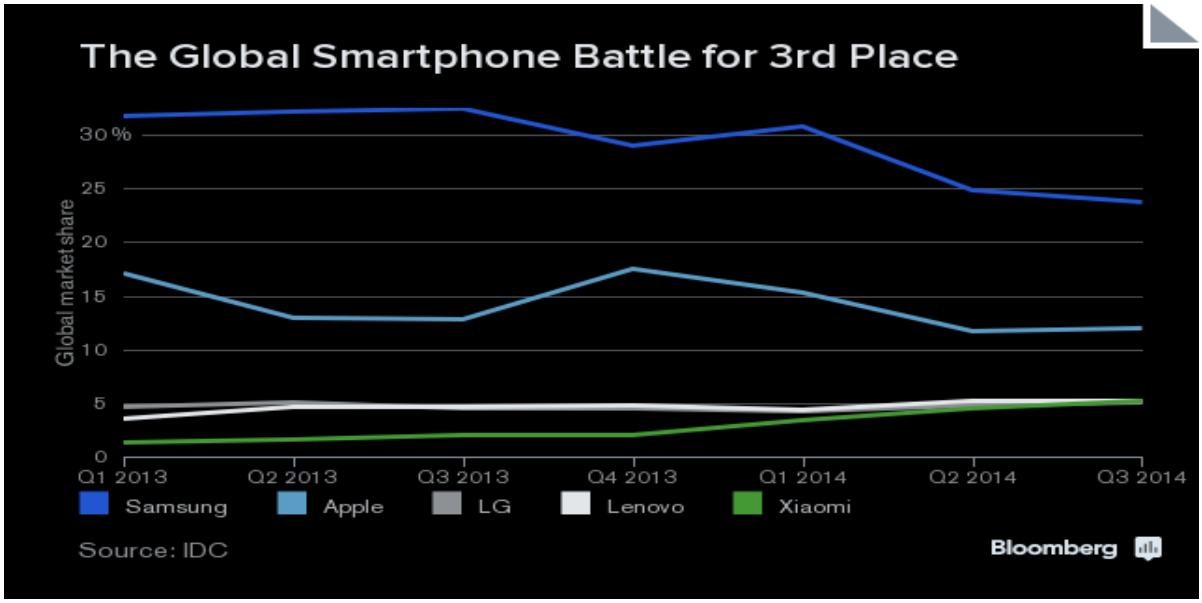
GRAPH 1. Smartphone users and worldwide Penetration (Adapted from dazeinfo.com 2014)

3 COMPETITIONS AND STRATEGIES

Only three years after launching the first mobile devices, companies from China's Xiaomi has officially become the smartphone manufacturer's No. 3 in the world behind only the big two which are Samsung and Apple with sales increased 3 times in Quarter 3, 2014. Press release of this ranking is an international consortium transmitted data at 10 am on 31/10 (Chinese time) (Samuel, 2014). However, at 6 pm the same day (only 8 hours later), Lenovo officially announced completing the purchase of Motorola Mobility from Google.

Thus, according to the analysts at IDC and Strategy Analytics, once the purchase agreement of Lenovo completed means that the company suddenly and twisted house of Xiaomi and ranked 3rd in the ranking House Smartphone manufacturer world's. This quick swap clearly shows the heat between mobile manufacturers has never stopped. While Samsung and Apple are "seated" on the highest top with a market share of 23.8%, respectively and 12%, the 3rd place seemingly "invincible" and the time is now temporarily located Lenovo after the acquisition agreement Motorola completed.

Xiaomi is currently taking 5.3% global market share in Q3 compared with the same figure of 5.2% of Lenovo before acquiring Motorola. South Korea's LG Group is close behind with 5.1% market share.



GRAPH 2. Smartphone brands ranking (Adapted from Bloomberg 2014)

3.1 Technology Wars

If in the past, smartphones hadn't had much distinguishable than the normal telephone but since the iPhone came out, the boundaries between feature phone smartphone is becoming clearer nowadays. And thus, a series of smartphone devices from many different manufacturers have been created to compete with the iPhone. Finally the results is something inevitable, to be able to compete with Apple, some other manufacturers have good sales like Samsung, LG, Xiaomi have to improve themselves which lead to a fiercely race of upgrading hardware and software features.

3.1.1 Hardware

Previously, Steve Jobs once said: "No one will buy a smartphone with big screen". And in fact everything was happening as opposed to what he said. Not just smartphone users prefer the larger screen sizes, there is even a new term for these big screen phones which is known as "phablet".

The screen size on smartphones are growing and the one initiated this race is none other than the Samsung. The product with its large screen such as Samsung Galaxy Note 1 showed that large screen smartphone is very useful. Even Apple cannot ignore the pressure of why the iPhone still does not have the big screen since other firms strong competition by the phablet has made great influence to Apple's sales. This led to Apple also have to increase the screen size on their iPhone from 3.5 to 4 inches, or more recently as 4.7 inch and 5.5 inch on the iPhone 6 and 6 Plus (Yoshikazu 2014).

The race is not only the size but also the screen resolution. In 2012 HD display is standard, however in 2013, Full HD is the new set and in 2014 the maximum resolution has increased to 2K. According to some studies, apparently, human eye can only see at a pixel density of 300 ppi which means smartphones with approximately 4.7 inch with HD resolution is enough. But now, HD resolution is only on the mid-range smartphone (Erik 2013).

High resolution display is only for devices with large screens like phablet but the notion of users is that they always want to buy best things with the money they have. Therefore, high-resolution screen is always their first choice. Of course, high-resolution display on devices with small sizes only reduce battery life and not really helpful. But very few people are interested in it.

Although powerful processors will bring a better experience for users. However, sometimes it gives users a new smartphone with high profile becomes negative. Quite a lot of equipment owned processor's 4-core or 8-core ... but in the course of actual use, it is quite annoying due to the lag phenomenon, shock, heat or air-fast battery wastage. Even the use of multiple processors simple multiplication purposes only to promote products and service for "test benchmark". Once upon a time, the technology world tremble when firms such as LG, Samsung ... fraud to attain higher benchmark than normal.

The race configuration is not necessarily indicative negative connotations. The development of microprocessors with amazing speed has helped the mobile devices gradually catch up with products such as Laptop, PC ... On the Android product, this development in hardware has kept customers from turning their backs to this operating system due to its instability.

Apple is the only company which is still out in race of configuration and now the camera resolution. Both its latest products remain as 8 megapixel resolution compare to its predecessor. However, the image quality of iPhone has always been appreciated by users. However, improving resolution camera on the smartphone will provide better image quality, and the high camera resolution can get a lot of the attention from consumers.

Although the camera resolution does not play important roles in the image quality, but it is valuable in changing the user thought about selecting any smartphone camera. However, deciding image quality depends on a lot of different factors. Therefore, if the product has high resolution but the image quality is still poor then it really is a disaster.

Although only booming recently after a new trend of using “selfie rod” and the term "selfie" became popular worldwide, the secondary camera begins to be used more equal, even more than the main camera. Yet, in many different conditions, limitations caused front camera to capture more than one person or the resolution doesn’t satisfy as the user wishes.

Understanding this need, in addition to upgrade the main camera, mobile firms have begun to focus on front camera resolution and aperture. A series of newly launched smartphone with a high resolution and wide aperture has been made to support the trend called "take a selfie", typically the HTC Desire Eye, Samsung Galaxy Prime or Nokia Lumia 730 Grand.

3.1.2 Software

The race among smartphone manufacturers is not limited only on developing hardware, it is also happening in software development. The two biggest application stores for users are Google Play (for Android users) and App Store (for Ios users). Google Play (previously known as the Android Market) is an international online store where users can download all kind of applications which are developed by Google for any devices that run Android. It was introduced in October 2008. According to a survey conducted in 2014 has shown that approximately 1.3+ million apps have been made for this operating system, and 40 billion applications were said to be downloaded from Google Play (Steve 2014). The later, App Store is a digital distribution

platform for mobile apps on iOS, developed and maintained by Apple Inc. In June 2015, Apple announced there have been over 100 billion apps downloaded from the App Store.

Users can download almost anything from these stores, from entertainment applications to health care apps. People can check their blood pressures, track their phones, and monitor their houses from distance with just one click. “Your smartphone ought to be smarter,” Aparna Chennapragada - Google director said when he was trying to demonstrate one of many new features on-stage at the developer’s conference hosted in San Francisco. The popularity of mobile apps has continued to rise, since they are used by more and more people. A study reported conducted on May by comScore has proved that during the first quarter of 2012, more mobile users used apps (51.1%) than surfed websites on their devices (49.8%). According to market research firm Gartner, 102 billion apps will be downloaded by 2013. Even though 91% of them will be free but they will still generate US$26 billion, increase 44.4% from US$18 billion in 2012. Estimated by an analysist has shown that the app economy makes profit of more than €10 billion per year just in the European Union, fortunately 529,000 jobs will be created throughout all 28 states of European Union thanks to the growth of the app market.

3.2 Competition between smartphone brands

There is no doubt that smartphone brands are forced to compete. As a matter of fact, the competition is much more fiercely than anyone could imagine. We are talking about a full scale running contest here. This chapter will mostly mention four most popular sections that brands are using: Price, Design, Operating System and Patents.

3.2.1 Price

A year ago, the marketing departments of almost all the leading brands of Android smart phone is busy with making multicore processors, GB RAM and growing number of megapixel. In the race to get the specification sheet prices have easily crossed $600 - and even $750. However, the game is now changing. The battle for the best specifications has become an all-out price war

while the manufacturers are trying to figure out the next “killer” feature, now, at relatively speaking, price under bargain.

Smartphone brands of Micromax and Karbonn from India are the first brands to realize that competing on price is the key to success in the country (Parab 2014). Nearly two-thirds of the smartphone market are priced below $150 segment by IDC. International brands jump on the bandwagon of this, and the equipment of the most successful Nokia Windows Phone - Lumia 520 - launched just over $150.

In the past 12 months, although Motorola still leading with Moto E and G smartphone thank to its affordable price, followed by Asus with ZenFone ZenFone 4 and 5 - but there is even cheaper one – which is the "Chinese Apple "Xiaomi has entered the war with Mi 3 smartphone, which has specifications comparable Flagships from Samsung, Sony, and HTC, but it is available in nearly a third of the price.

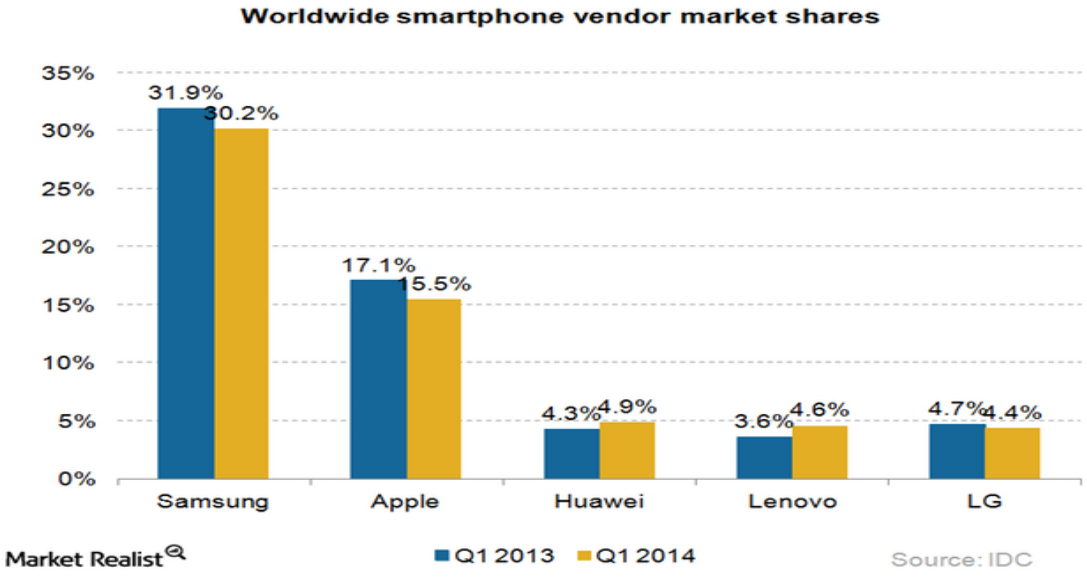
Karan Thakkar, senior market analyst - Tablets, Enterprise Equipment Clients and computer screens of IDC, told NDTV Gadgets via email that the smartphone brand of India has forced global players consider their prices again. In 2015, the low end of the smartphone market worldwide is getting even more competitive.

On 28 July 2015, Lenovo owns Motorola has announced three new devices: the Moto G, Moto X Moto X Play and Style. Moto G starting price is $ 179 without a contract. The Company will disclose the price of the two models Moto X in the coming weeks, according to The Associated Press. And yesterday, the phone manufacturer China Oneplus introduced its latest device, the Oneplus 2, with a price tag starting at $ 329 without a contract for two years.

"Increased competition is something not to be missed", Dan Ives, an analyst at FBR Capital Markets, told CNBC. "That being said, it's going to be very difficult for these lower-end competitors to really move the needle for the likes Apple and Samsung," Ives added. "Their market share is iron clad in terms of their base."

It is clearly not safe for high-end brands for Samsung and Apple. Samsung is facing many threats in the high–end smartphone market. The company released its high-end Galaxy S5 smartphone in April last year. But the Galaxy S5 didn't succeed as much as analysts had expected. In the UK, The Galaxy S5 ended up being the third-highest-selling, after iPhone 5S and iPhone 5C even those two were released in September the previous year. The situation wasn't too different in the U.S, according to a report conducted by Kantar Worldpanel ComTech, Galaxy S5 was the second best-selling device. The leading smartphone in this area is still iPhone 5S.

Turning to low-end smartphone market, Samsung is struggling in China and India.



GRAPH 3. Smartphone shares worldwide (Adapted from Market Realist 2014)

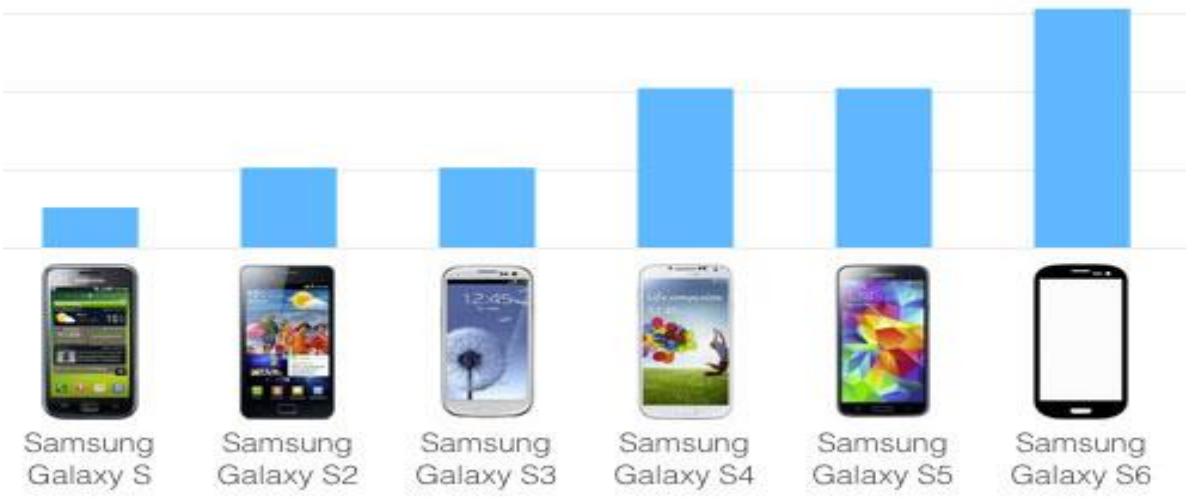
Both Samsung and Apple are losing their market shares to smaller players such as Huawei, Xiaomi and Micromax. In China, for example, Xiaomi set advanced specifications in their phones, but sell them at medium or low price. The company has been in the industry of smartphones for only four years, but it has surpassed Samsung phone market with the world's largest equipment for $ 154 or $ 322 with Mi Redmi Note 4. In comparison with leading Galaxy S5 Samsung phone, which has similar specifications as Mi 4, retails for about $ 650 off contract (Edmond 2014).

3.2.2 Design

Smartphone has changed a lot in an extremely contradictory way. The first stage of the mobile phone era began in 1985 with the Vodafone desktop V1 with 4.9 kg heavy. With 4.9 kg, the V1 depended on telephone line which has made Vodafone V1 only be put in place and cannot bear to go. The users required a more mobile and smaller device, about one year later, the Motorola 8000X was presented, but it still cannot be stuffed into customers pockets. Years later, the modern phone generation appeared. From 1989 to 2010, Nokia - Motorola - BlackBerry's were the big three markets held at that time.

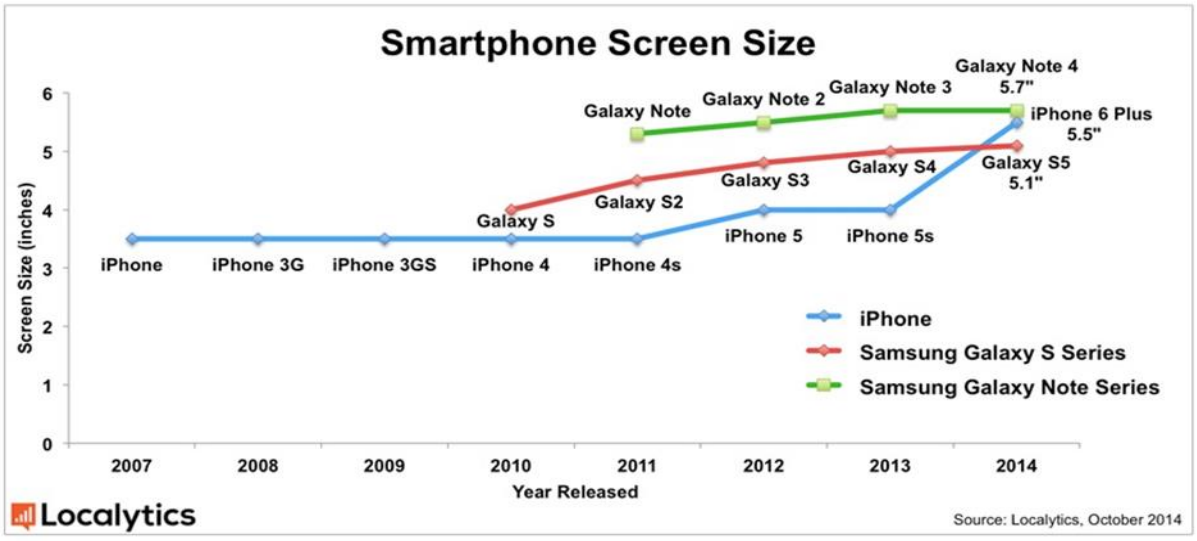
Until 2007, when Apple released the first iPhone, the market all began to change gradually, smartphone concept was born, touch screens replace the traditional QWERTY keypad and of course the phone size from began to become bigger again. HTC Desire with a 3.7 inch screen, and then the period phablet with 5.3-inch Galaxy Note in 2011.

Let’s have a quick glance at any major smart phone brand and you'll find out that they all have a similar pattern: The screen size is getting bigger, year after year, model after model. Let's start with an audit of the Android smart phone world's most famous line-just look at the size of Samsung phones climbing up the first chart below. Not to be outdone, HTC has kept pace with the escalating size screen of Samsung, and Nokia have followed industry trends with its Lumia line.



GRAPH 4. Samsung Galaxy S Screen Size Over Time (Adapted from Techlicious 2015)

Even Apple had described the iPhone 4-inch screen of it as a "brilliant display of common sense" -appears ready to follow its rivals. Recently, Apple has released the IPhone 6 which is 4’7 inch and the IPhone 6 Plus with 5’5 inch.



GRAPH 5. Smartphone Screen size over years (Adapted from Ventureabeat.com 2015)

There are plenty of different reasons for this to happen. The first be name should be it’s the marketing campaign play by smartphone manufacturers. Apparently, customers are much more

interested in new hardware design than those flashy software features. It is easier to develop a bigger scale and then scale it down to where the application supports consumer trends. In the end, it is about consumer satisfaction, and eventually, it will affect the competition. On smartphones with smaller screen, it takes forever to find the button to scroll to the next page when reading online. Reading email or watching films feel much better on a big screen. Part of the reason behind the switching back to screen larger smartphone has to do with the functionality of the application. As mobile marketing becomes more important, the blending of technology as well. How do you combine web, mobile technologies, and mobile shopping? The answer is to increase the screen size.

The second scenario for this new trend could be the influence created by iconic brands on the field. There may be more than 1000 phones on the market, but only about half a dozen dominated headlines and sales. With each successful change (eg, display of iPhone 4, or the development in camera in Lumia), other phone has quickly followed. This may also true for screen size. Or perhaps, manufacturers have always wanted to make bigger screen but the technology in the past didn't allow that. We are now experiencing a booming era of new technology so maybe it is possible for smartphone makers to start making phones with big screen.

Smartphone used to be seen as a combination of three others devices: a music player, a mobile web browser and a cellphone. However, it is now popular all over the world. Almost everyone owns one. Since it has become primary device, manufacturers have made it into multi-functional machine. Customers can do anything with their phones, from watching films to buying stuffs from the internet. Apparently, smartphone is step by step replacing laptop. The smartphone is no longer just a phone, but a hybrid of device and a bigger screen allows it to function all of these roles at once.

3.2.3 Operating System

Many people have extensive knowledge about various mobile phones and their companies, but very few of them know anything about operating systems which is indeed very important to

know about since only by knowing will customers can really understand what is behind the smartphone smoothness and colorful touchscreen.

Symbian OS used to be a closed source mobile operating system but it is now an open source platform. It is widely used by many brands such as Samsung, Motorola, Sony Ericson and above all Nokia. Nokia remains a giant in the low-end market of mobile phones, and it remained as the most popular OS until 2012. Though it is still widely used in low-end phones, but there has been a sharp decrease in demand rate. Overall, the Symbian OS is designed excellently and very easy to use. Unfortunately, Symbian OS graph is going down today due to the popularity of Android and iOS. Some phones are currently running on Symbian OS are the Nokia C6-01, Nokia 603, Nokia 700, Nokia 808 Pure View, Nokia E6 (ANNA) and Nokia 701 (BELLE).

Blackberry OS is the property of RIM (Research in Motion) and was first released in 1999. RIM has developed this operating system for the Blackberry line of smart phones. Blackberry is quite different than other operating systems. The brand is famous for its style of interface design. Their smart phones have a trackball to move on the menu and a QWERTY keyboard

Like Apple, Blackberry OS is a closed source operating system and not available for any other manufacturer. Currently the latest version of this operating system is Blackberry OS 7.1 was introduced in May 2011 and is used in the Blackberry Bold 9930. It is an operating system very reliable and immune to almost all virus. Some of the smart phone works on the Blackberry OS Blackberry Bold, Blackberry Curve, Blackberry Torch and Blackberry 8520 (Chris 2009).

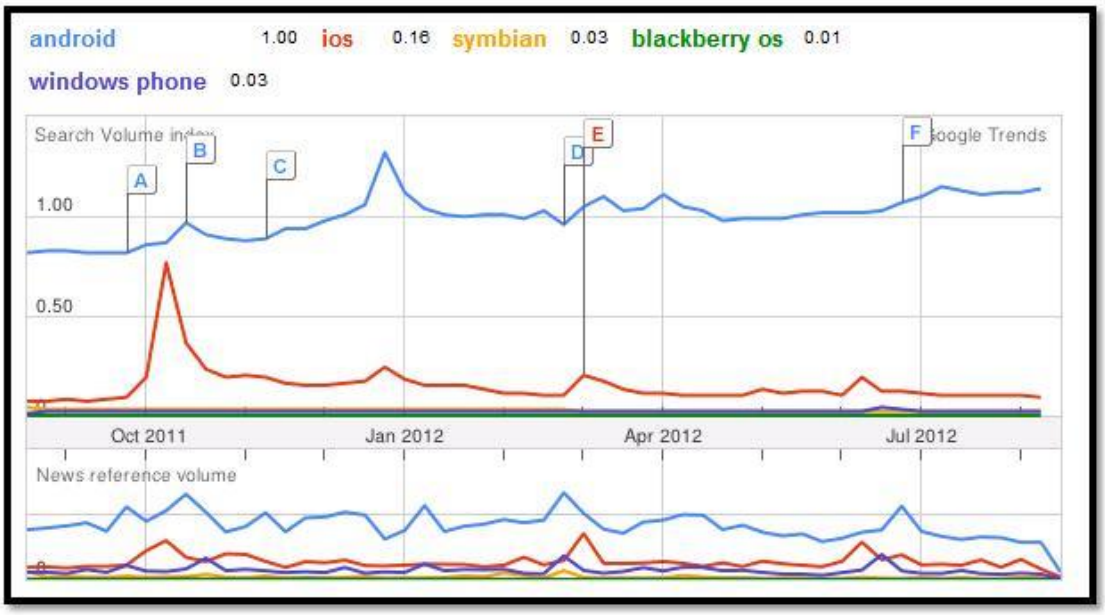
Most of you must be familiar with Microsoft operating system since it is used in almost every computers worldwide. However, it is quite difficult to use when it is designed to function on a mobile phone. But it still gains a lot of attention and rapidly becomes popular. One reason for its success could be that it is operated on very powerful devices made by Nokia. Even Samsung and HTC also released a number of Windows-based phones, but they may not have much in the market place. Nokia Lumia series is entirely based on the window. Some of the newest Windows Phone Nokia Lumia 800, Nokia Lumia 900, Samsung Focus and HTC Titan 2. Microsoft is now hard at work on Windows 10, which will be a unified OS that runs on everything from PC’s to

tablets and phones. Microsoft's problem isn't the technology or software, but rather the issue of winning the hearts and minds of consumers.

Unfortunately, in the race to win the smartphone OS battle, it's hard to see Windows Phone or BlackBerry make any inroads into Android and iOS' market share anytime soon due to this reason: most smartphone buyers tend to fall into two categories: those who love Android huge selection of devices and prices or those who prefer a closed system worked on a premium devices such as IPhone and IPad.

Google first released Android on September 20, 2008 and this operating system quickly gained immense popularity thanks to its beautiful appearance and a huge amount of applications. Google Play is an official app market which contains millions of different apps for android devices. Top manufacturers are using Android in their devices are Samsung, HTC and Sony. Currently Android is one of the top operating systems and is considered a serious threat for iPhone. As for it wide range of price, Android market share is strongest in low income countries.

Turing to IOS operating system, it was introduced in 29th June 2007 and through many upgrades it has reached IOS 8. It is still exclusive used by Apple and unlike Android, the company focus on the performance rather than appearance. In another word, Apple sell experience, not hardware. IOS also has App Store which contains millions of applications. One benefit over Android is that it is a closed system so its security is much better and at the moment it is still the best looking phone.



GRAPH 6. Smartphone popularity graph (Adapted from Shout me Loud 2015)

3.2.4 Patents

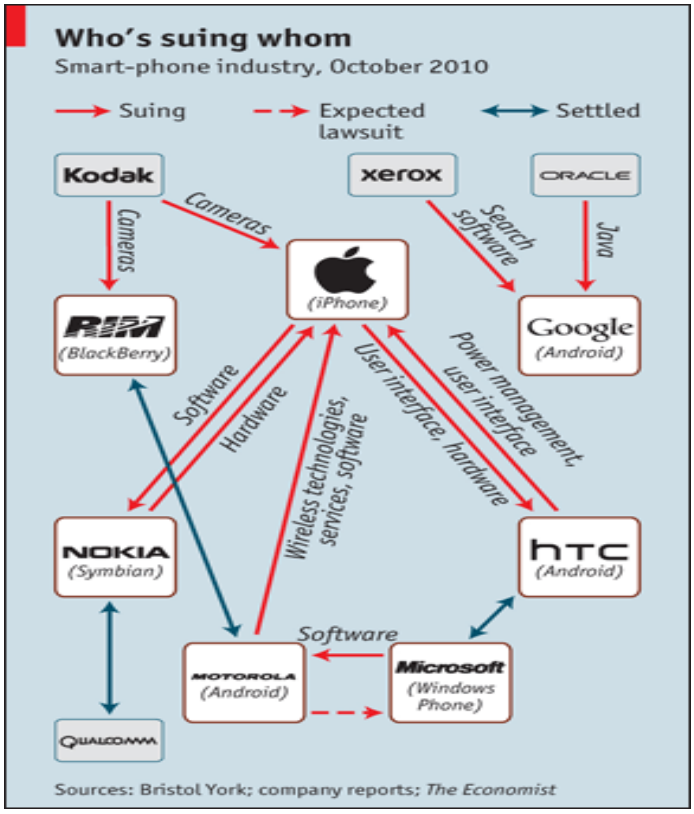
Patents are invented to protect intellectual property and encourage innovation, giving innovate companies advantage over their rivals. However, these patents have been used as threats through litigation. It all started in 2009 when Nokia kicked off the “smartphone patent wars” by suing Apple of using some of Nokia’s standard essential patents (SEPs) without paying. However, in 2011, Apple agreed to pay an undisclosed sum of money as a part of settlement to gain approval to use Nokia’s patents.

Apple started war against Android in 2010 when it sued Taiwan's HTC Corp (2498.TW) over 20 patents dealing with user interface and its operating system. Along with its federal lawsuit, Apple has applied to the International Trade Commission, the US, again targeting the Android software behind HTC's smartphones. The International Trade Commission issued a statement in late 2011 to halt imports of HTC smartphones violate - the One X and EVO 4G LTE - starting in April. Shipments of the two smartphones to the United States has been delayed. Apple has filed at least two additional complaints with the International Trade Commission demanding emergency action against more than 25 HTC devices. In the past 14 months, HTC shares have fallen 72 percent, while Apple shares have risen 65 percent (Whiteman 2014).

Motorola Mobility joined the battlefield in October 2010 when it filed a lawsuit against Apple in what was considered to be a pre-emptive attack. However, Apple counter sued in the very same month. However, the judge Richard Posner in Chicago canceled the trial was set to happen in June, and denied the request from those two companies. Just 2 years later, Motorola was bought by Google.

South Korea-based Samsung Electronics Co Ltd (005930.KS) found its way to US court in April 2011 when Apple claimed that Samsung has violated Apple legal patents with Galaxy smartphone and tablet, which uses Android system. Samsung counter sued, and the two companies have become entangled in more than 20 cases in 10 countries (Brandon and Jason 2012).

In 2013, a series of patent lawsuits were launched against Google and its Android partners by technology corporations including Microsoft, Apple, BlackBerry, Sony, and Ericsson. These companies came together under the name Rockstar to attack the one of the largest search engine in the world in what is described as a "nuclear attack" in the patent wars smartphone. At first, Google has spent 900 million dollar for patents before the bidding war begin but Rockstar has pushed the price up to 4.5 billion. To deal with the defeat, Google quickly purchased Motorola for 12.5 billion dollar. The suits had been filed target Google as well as Android brands such as Samsung, HTC, and LG… The patents allegedly being infringed upon cover a wide range of technology, from technical protocols involving 4G communication to a patent for an “associative search engine” that “provides advertisements to a user searching for desired information within a data network”.



GRAPH 7. Smartphone patent wars (Adapted from The Economist 2010)

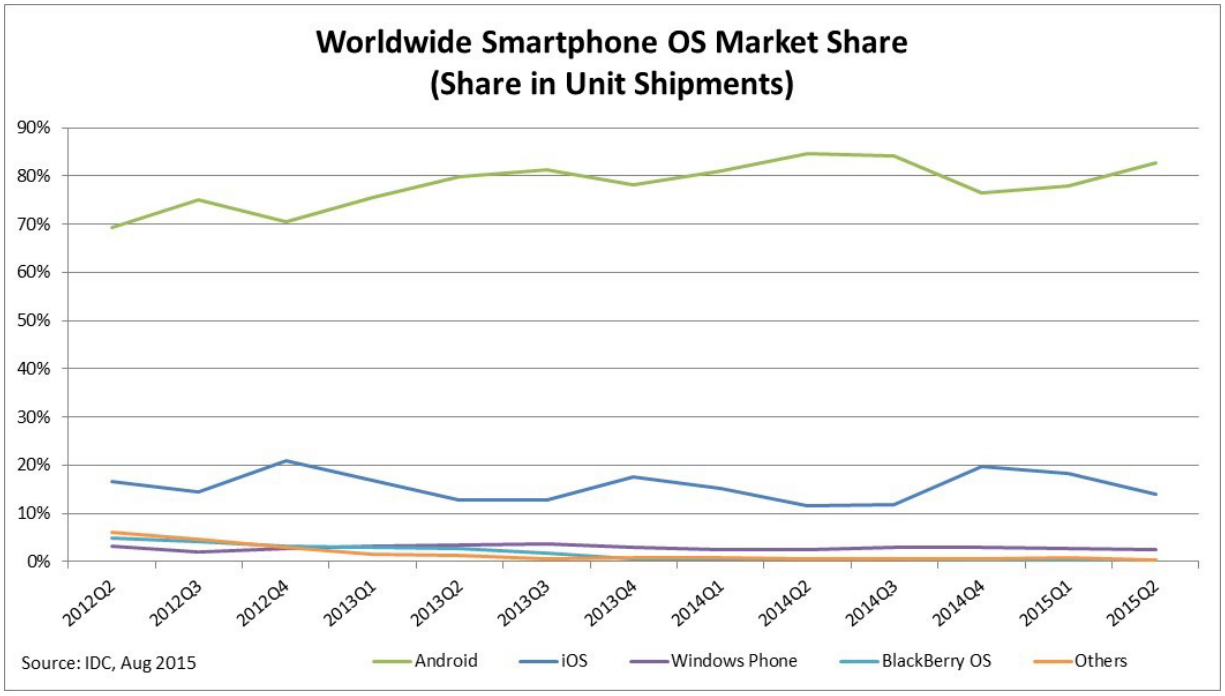
Fortunately, Rockstar has put those patents on sale. This is a sure sign to prove that the patent war is coming to an end. Rockstar is selling more than 4000 patents to a joint-stock company called RPX, which will license all these patents to others companies. The remaining patents, which sum up about 2000 were distributed to others companies, particularly to Apple. Which was reported to have snapped up 1000 patents in 2012. "Peace is breaking out," RPX's CEO John Amster told the Wall Street Journal. "I think people have started to realize that licensing, not litigation, is the best way to make use of patents, and this deal is a significant acknowledgment of that reality" (Anthony 2014).

It seems to be that the war between major players has ended. Back in 2012, Google was very concerned about the patents situation with Android. That's the main reason it bought Motorola Mobility with $12 billion dollars. But eventually, all these major players have able to sit down and resolve most cases and agree to license each other patents.

4 SMARTPHONE MARKET SHARES

This chapter will focus mostly on the market shares of smartphone brands. The next section will be a short introduction about smartphone pioneers and in the end the new era of smartphone with IOS and Android being the dominants

4.1 Market Fragment



GRAPH 8. Smartphone Market Share (Adapted from IDC 2015)

Period	Android	IOS	Window Phones	Blackberry OS	Others
2015 Q2	82.8%	13.9%	2.6%	0.3%	0.4%
2014 Q2	84.8%	11.6%	2.5%	0.5%	0.7%
2013 Q2	79.8%	12.9%	3.4%	2.8%	1.2%
2012 Q2	69.3%	16.6%	3.1%	4.9%	6.1%

As can be seen from graph and table above, Android still dominated with 82.8% market share. Samsung is still the greatest contributor with a lot of hit products such as Galaxy S6 and S6 Edge. However, it seems to be that Samsung is losing customers to its number one rival: Apple. Apple has experienced a significant growth from 11.6% in 2014 to 13.9% in 2015. Sales of iPhones totaled 48 million during the second quarter compared to 35 million in the year-ago quarter. In the meantime, Samsung market share dropped from 26.9% to 21.6% even the company sold managed to gain $76 million compared to $72 million last year profit, it seemed to be that the company hasn't abled to keep pace with Apple.

As for Windows Phone, they has able to get 0.1% higher than the previous year. And frankly to say, things don't look to go nicely for Microsoft since its market share dropped significantly from 3.4% in 2013 to 2.5% in 2014. However, the company's mobile platform still able to stay on a steady road despite the fact that a huge number of their customers have shifted to another brand, Windows Phone still manage to have almost double the number of users compare to Blackberry.

Blackberry seems to hasn't able to turn around its fortune just yet. The company continued to decline its share globally. Over the last 3 years, their shares has dropped more than 4%. Apparently, Blackberry will have a hard time try to get back to its position.

4.2 Fading day of smartphone pioneers

History is always a part of who we are and it is crucial to look back at the pioneers of smartphone to understand how they gained all their success, which phrases were the prime time and the reason for their failures. What we learn after these stories is the chance to look at ourselves nowadays, to learn from mistakes and to develop in a different way.

4.2.1 Palm

Palm Inc. was founded in 1992 by Jeff Hawkins with a headquartered in Sunnyvale, California. Talking about Palm, surely no one can forget the phone Treo600 - one of the first smartphone in the world. On April 28- 2010, Hewlett-Packard – CEO of HP announced that the company would purchase Palm at $5.70 a share for $1.2 billion. But in 2010, HP has sold a large amount of Palm trademarks to a Chinese Tech firm called TLC. This may be due to the very poor sales of Touchpad which made HP announced that the company would end any production and support of all Palm and WebOS designs. The situation is bad enough in 2013, in an interview with Fierce Wireless, former Palm CEO and webOS creator Jon Rubinstein has said that: “Im not sure I would have sold [Palm] to HP. That’s for sure. Talk about a waste” (Bilton 2013).

4.2.2 Nokia

Nokia was founded by Fredrik Idestam in 1871 but not until 1967 the Nokia Group (Nokia Corporation) has been born after the merger of three subsidiaries: Nokia Company (Nokia Aktiebolag), Finnish Rubber Works Ltd (Suomen Gummitehdas Oy) and Finnish Cable Works Ltd (Suomen Kaapelitehdas Oy) (Gordon 2013). 20 years later, Nokia first launched a mobile phone called Mobira Cityman 900 (Goodwin 2015). Nokia is also a key member in the development of GSM technology - technology that so far it is still popular worldwide. But perhaps, the product that made Nokia to become the "king" is the development of Symbian OS. And from this group have dominated Finnish phone market in the world for several years after the defeat of the Microsoft Windows Mobile. It is no coincidence that of the 20 best-selling phone in history, Nokia has completely dominated, not only monopolize the top, but also accounted for more than half of them. Nokia gained popularity worldwide in many countries to a level that one cannot speak about phones without mention Nokia.

2007 might be the milestone for Nokia when Apple unexpectedly launched the first iPhone, which has redefined the mobile phone as a device that close to a personal computer with touch screen applications and batch of extremely attractive applications. From here, the world's largest market capitalization has been reduced to 75% while Apple's value has skyrocketed. Not only does the smartphone market that caused pain to Nokia but even low - end phone market has also

increasingly been constrained by the pressure of Android smartphones. QI / 2012, Nokia officially to abdicate the market leader mobile phone to Samsung, ending 14 consecutive years in this unique position. At this time it was said that Stephen Elop chose the wrong strategy for Nokia when he decided to use Windows Phone OS.

On May 1/2013, Nokia officially announce the death of Symbian operating system when it has no value to investors, customers, partners and on 2/9/2014, Nokia announced it had sold the array device and its services along with a number of patents to Microsoft for $ 7.2 billion (Warren 2015). This acquisition was completed in the first quarter / 2014. This has put an end to Nokia. Because after this deal, Nokia will not produce any mobile devices and the company will only focus on technology and patent rights.

4.2.3 Blackberry

Blackberry Limited or Research in Motion Limited (RIM) s a Canadian telecommunications companies and wireless devices. It is popular for brand of smartphones and tablets, but also well known worldwide as a provider of security software and high reliability for industrial applications and mobile device management. Blackberry used to be a dominant company in the smartphone market with 43% US market share in 2010 but for the past few years, the company has been experiencing a sharp decline in profit.

There are several reasons for the failure of Blackberry. Blackberry internal disagreements arising from the early days of the iPhone appeared on the market. Half of the leaders wanted to develop touch phone to catch up with new consumer trends while the other half wanted BlackBerry to retain its identity with the handset using the physical keyboard. The disagreement lasted until the end of 2010, when Thorsten Heins – CEO of Blackberry wanted to launch Z10 – a touchscreen smartphone. However, co-founder Michael Lazaridis has opposed the plan, saying it is a wrong decision. Heins did not listen and the result is terrible. Blackberry has reported losses of $ 965 million, most of this loss is due to expenses incurred due to increase in unsold Z10 in the market (Ranger 2013).

Blackberry OS was developed based on an old platform, it was less attractive than IOS and Android. In addition, RIM also made too many regulations before allowing applications to run on BlackBerry and this makes the creation of the developers stunted. "Developers want to be welcomed, not to be controlled". That was the reason that applications like Instagram or Tumblr have said no to BlackBerry. Failure in America (impossible to co-operate with Verizon to defeat the duo of iPhone and AT & T), along with the inability to penetrate the Chinese market, the BlackBerry seems to have lost two big markets. The company now only has few remaining loyal users in North America, several European countries and Southeast Asia.

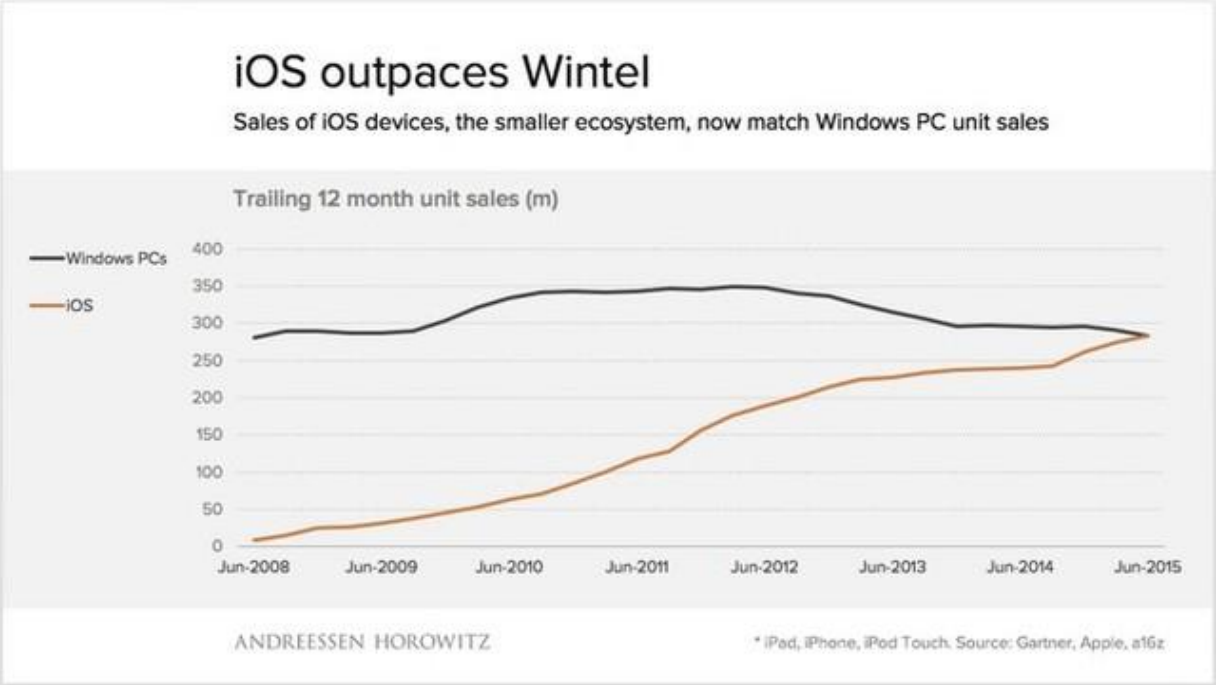
4.3 Era of IOS and Android

One of the main reason that caused the failure of many smartphone pioneers is the rapidly development of IOS and Android. According to a report on smartphone sales carried out by Gartner on the second quarter 2015, the current Android and iOS continue holding large slices of the market share in the OS device. The report shows that the total revenue from the smartphone market quarter 2/2015 was $ 329 million, while Android and iOS accounted for USD 319 million (96.8% share). As the experts said, Android is still dominated the smartphone market when held up to 82.2% of the smartphone, which was followed by iOS with 14.6% market share.

The mobile operating system market now primarily in the hands of big as iOS, Android and Windows Mobile. Apple claimed that it has sold over one billion iOS devices since its launch in 2007, Microsoft is hoping chasing the numbers 1 billion devices running Windows 10 in 2018 but the winner is still Google, currently has more than 1.4 billion Android users. The latest official data about Android users has increased by 400 million compared to 1 billion users as announced in June 2014 and 900 million by May 2013.

Devices running iOS including iPhone, iPad and iPod continued to experience strong growth in sales. And according to the latest statistics, the sales of Apple's iOS devices is now equal to the

total PC Windows sold. It's a new milestone for Apple, published by analyst Benedict Evans, based on data collected from Gartner, Apple and a16z. Statistics also show that Windows PC sales remained stable in recent years, around 300 million units mark. Meanwhile, Apple's iOS devices have the extremely strong growth. Although including iPad and iPod, but this growth came primarily from sales of iPhone. For iPad and iPod sales are showing signs of leveling off or even declining.



GRAPH 9. IOS Devices Sales Compare to Windows PC Sales (Adapted from Spider-Mac 2015)

4.4 New trend in smartphone market

There is a fact that Apple is probably the only brand hasn't launched any product to compete in the low - end smartphone market, and perhaps the company does not see the appeal in this market segment. But on the contrary, Samsung, LG, Sony, Xiaomi ... are to exert its influence in the low - end segment or even more is the mid-range with price approximately 300$.

In fact cheap products never afraid to lose, and the future for not well known firms which do not want to risk in the high-end products such as Xiaomi, Asus, Lenovo and LG, the Cheap phone sector remains a potential market that brings success to them.

According to ICTnews - Two Chinese domestic company Xiaomi and Huawei has surpassed Apple in smartphone sales in the quarter from March to May 6/2015, according to market analyst firm Canalys. After two quarters as a smartphone market leader in China, Apple recently being pushed down to third place by two local firms called Xiaomi and Huawei. This is information analysis firm Canalys released market. Canalys statistics is done in the second quarter / 2015. Accordingly, currently Xiaomi has become the largest smartphone manufacturer China with a share of 15.9%. Huawei comes second with 15.7%. Behind are Apple, Samsung and Vivo.

While growth in China in recent years has been driven by the homegrown talent, the situation is a bit different in India. India also has its own local players already established on the market, but is facing competition from a large number of external manufacturers, which both have experience in conditions emerging and advanced markets. Xiaomi, OnePlus and Lenovo (Motorola) are just a few of the Chinese companies compete with Micromax, Lava, Karbonn and other companies of India. Samsung and Micromax holds the largest share in India at 48 percent combined, leaving the remaining 52 percent of this growing market ready.

A wide range of devices including the Motorola Moto E was introduced recently by Sony Xperia E and line demonstrated that high-powered technology could come with a cheap price. Both cost about $ 150, or about one-fourth the cost of a high-end HTC One, Samsung Galaxy S or iPhone. The proliferation of high-performance phone has made a hard hit on Samsung hard. The South Korea electronic giants has a history of covering the market with models in all sizes and prices which are supported by large marketing budgets. That worked fine for Samsung, but it is not clear how such a high cost structure and sustainability will counteract with the latest trends. Manufacturers of low-end Android phones, including the use of Microsoft Windows Phone and Mozilla's Firefox OS, will also be affected.

5 FUTURE GENERATION OF SMARTPHONE

5.1 Technology Outbreaks

As the name suggests, the smartphone is capable of doing more things than the mobile phone, it offers additional, essential business functions such as web browsing, multimedia entertainment, games, etc. - like mini computers but small enough to fit in your pocket. Smart phones have appeared on the market for nearly two decades ago as an alternative to mobile phones which perform basic functions to enable two-way communication only by text or call. The smart phones of today have different scalability including the camera lens in building high quality, portable applications that support productivity, video-streaming and connectivity that allows millions to remain connected while on the move. And customers have the right to expect many more breakthrough in technologies in the future. One of them could be augmented reality

‘Augmented reality" or AR refers to what we perceive through our senses (usually sight) strengthened through the use of the computer-generated sensory input such as sound, video, images and GPS data. AR makes more information become available to the user by combining machine data properties with what we see in real life. Using the camera on your phone, you can point it where it "live" to get an overlay information about where you can find nearest place for example

Next is flexible screen, users can bend smartphones in every possible ways they want. Screens can be folded and unfolded, all thanks to Organic Light-Emitting Diode (OLED) technology. This paper-thin screen can even project future-features-smart-phones/ from both sides of the screen, so you can show pictures or videos to your friend on one side while using the other as a control. Or maybe 3Dscreens and holograms may become the next big thing. Smartphones may provide us with high quality screen resolution but customers want more. Combining 3D and hologram seems to be a great idea for those who enjoy watching films on smartphones (Michael Poh 2012).

5.2 Challenges

It is undeniable that one of the biggest challenges that mobile operators have to face nowadays is the increasing demand for better capacity. Wireless devices are driving data to an alarming rate which puts a massive strain on networks. A lot of smartphones now have 3G feature, however there are still some problems such as slow internet access, delay and interrupt in downloading or streaming. 3G is of course much better than traditional 2G, but mobile operators have to find ways to increase the efficiency of network architectures.

Thanks to great advance in technology, smartphones are now very powerful with many features. But what's the point when the battery life is still an unsolved riddle, especially when users use 4G or any heavy application. Recently application developers start to face a new challenge called fragmentation. The more diverse the selection of mobile devices becomes, the more difficult it is for app and game developers to produce a product that works on every device. This due to the facts that there are many operating systems and each one has different requirements and different policies.

Another big issue for mobile operators is security problems. It is so easy to hack a smartphone nowadays, even IOS operating system which is well known for high security can be hacked and jailbreak within a day. Others operating system such as Android is considered "too open", users can lost a lot of valuable data they save in their phones. Hackers can gain access through many ways and reveal user personal information just through a "harmless" application. Not to mention, there are many people choose to pay online through mobile payments applications. These has become one of the biggest challenge for users and operators.

5.3 Shifting in potential markets

Recently, Apple has opened 5 stores in China which is a first step of adding 40 retail stores across the country in 2016 (Colt 2015). The plan seems to be working. China has surpassed Europe to be the second biggest market after the USA. This is a sign proving there is a shifting in smartphone potential markets. For a long time, USA and Europe are the leading markets for

many manufacturers. But not anymore, smartphone companies have a tendency in moving their focus to Africa and Asia continents.

The earnings Apple received for the fourth quarter in China has grown to $12.5 billion, up from $5.7 billion, which accounted for 99% change (Pressman, 2015). The company also managed to sell 13 million IPhone 6 on its opening weekend, beating the 10 million record the year before. With this speed, soon the world's biggest country will be the most vital market for the world's largest company.

Beside China, there are many others Asia countries that are considered as potential market. Take Vietnam for example, Vietnam is now the fastest growing smartphone market in Southeast Asia where sales have reach $8 billion in the first half of 2015. According to a market research, 39.8 million devices have been sold, making it the third largest market in area, after Thailand (with 13% rose) and Philippines (16% rose). Recently, Samsung and LG has determined to build their factories in Vietnam. Samsung has invested more $15 billion into Vietnam. Leader of Samsung Electronics has commented that Vietnam is a dynamic market with a young population, always ready to receive new technology trends, a potential market for the introduction of new technology.

The same thing is happening in Africa, in 2019, feature phones will account for 27% mobile market in Africa, the smartphone market with price below US $ 100 per unit will continue to develop. A recent report by the consulting firm Global Technology, International Data Corporation (IDC) predicted smartphone shipments will reach 155 million units by the end of 2015 in the Middle East and Africa will rise 66% in the first quarter of 2015 (Sibusiso Tshabalala 2015)

5.4 Research Analysis

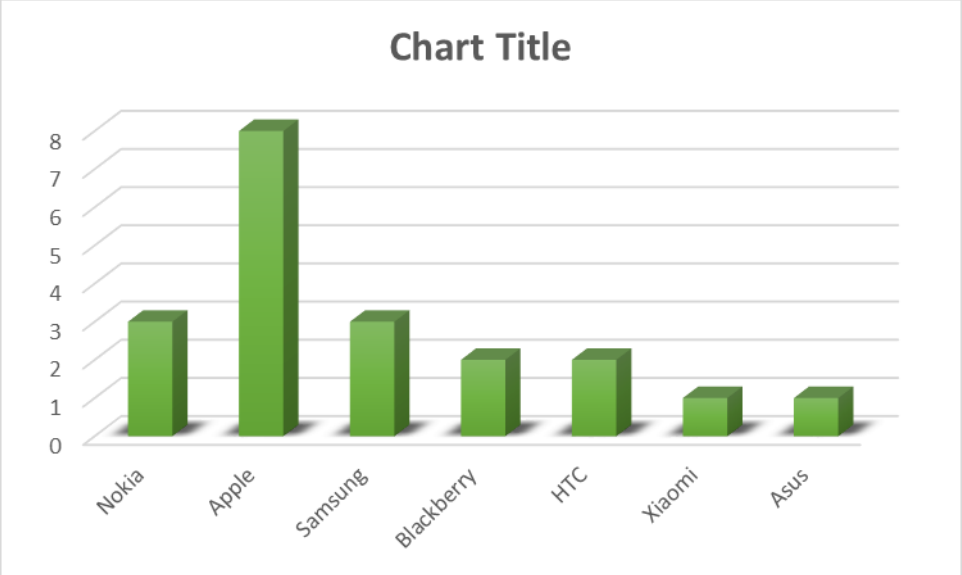
A quantitative research was carried out in order to gain more information about smartphone brands popularity and customer satisfactions among a limited number of respondents. These respondents answered the questions through an online survey website. The survey is uploaded

to a group of international students who are studying in Kokkola, Finland. The result is then collected by the same method and then analyzed.

The questionnaire was developed by Google Form. Questions are designed to be in English since the main target is a group of international student. The questions are upload to Google Form on 9th November 2015. The result is collected after only 2 days. The survey includes 11 questions, all are multiple choices questions. Respondents are supposed to answer the whole survey in less than 3 minutes since the questions are clear and easy to understand. As for the flow of the survey, it starts with questions about sex and age range. The next questions dig a little deeper into the main reason why respondents would choose the smartphone they are using and whether they are satisfied with it.

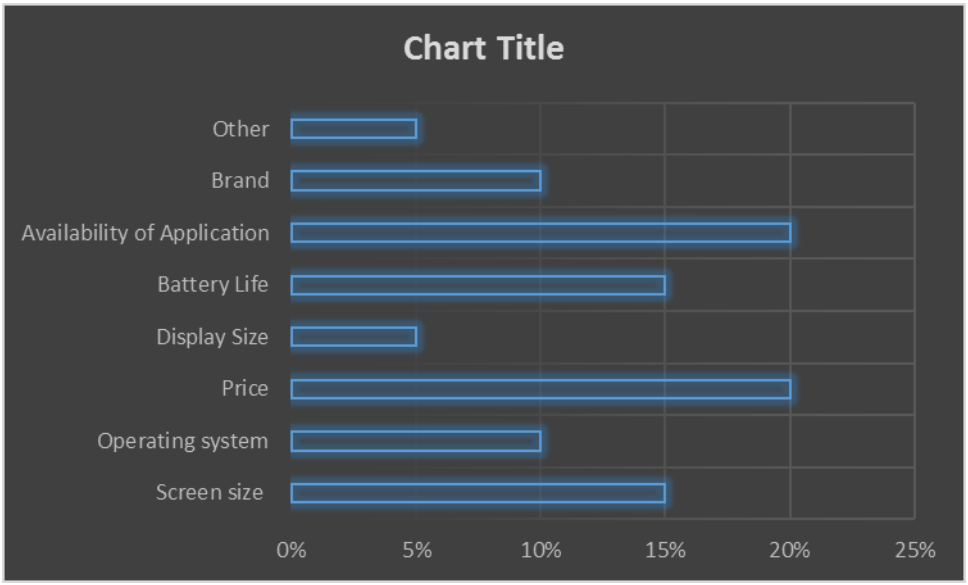
5.4.1 Research Result and Evaluation

A total number of 20 people has joined to answer the survey. Among them there are 16 females and 4 males. Most of them are from the range age of 18-24, only one respondent is from 31-35. This is quite easy to understand since the survey is uploaded into a group of international students. And as expected, all these students own at least one smartphone.



GRAPH 10. Which brand is your current smartphone?

Graph 10 gives out information about the popularity of smartphone brands that are used by respondent. As can be seen from the chart, Apple is the most popular brand with 8 votes. Nokia and Samsung share second place with 15%. HTC and Blackberry came at third position with 2 users. Asus and Xiaomi seems to be the least popular phones with only 1 user each. The next question aim is to know what is the main reason a person consider as the most important factor when he or she buys a smartphone



GRAPH 11. What will be the main reason when you choose a smartphone?

Price and availability of application are the top reasons when a student choose a smartphone. This is quite easy to understand since all respondents are students and most of them are financially depended on their parents so buying an expensive phone is not a good option to many of them. Smartphone also is a source of entertainment since many people play games and use a lot of applications to satisfy their needs. As I have mention above, big screen size is a new trend in smartphone industry so it is not surprise when 15% people see it as a main reason when they consider to buy smartphone and battery life also has the same amount. Surprisingly, brand and operating system is not very popular since only 2 people vote for these two. Bottom rank of this is Display Size. One of 20 students chose other and he did specify that Mail service is the main factor to him.

Question 6 is about respondent's favorite operating system. IOS is so far the favorite operating system to the majority of students with 55%. Android and Symbian are next with 25% and 10% respectively. Blackberry OS also get 10% while no one seems to be fond of Windows Phone OS. 13 students say that they are satisfied with their current operating system. However, despite being the favorite OS to many people, only 7 out of 13 claims that they are satisfied with the current version of IOS. While Android, even though only have 5 votes, but the rate of satisfy user is higher compares to IOS (60% vs 53, 85%). Both 2 Blackberry OS user vote satisfy and the percentage is 50% for Symbian OS.

Even though, only 8 out 20 people want to switch to another brand. However, if they have a chance to switch, 6 people will switch from their current brand to IOS, 3 to Samsung, surprisingly, 5 will try Blackberry and only 1 will buy a Xiaomi phone. As for updating operating system, 45% update last week, 6 out 20 respondents seem to not care about updating since they vote "I don't remember". 2 people do the update last month and the rest claim last year. Despite that, 14 are satisfied with their update, only 5 people accounted for 25% are dissatisfied. One even say that she is very satisfied with the latest update.

6 CONCLUSION

Smartphone industry has become one of the most intense industry in the world and with that the competitions between brands and companies are getting fiercer than ever. This thesis aim is to give readers a deeper look at the smartphone war and to understand and learn from the strategies each company has decided to use and to have his or her opinion on the whole development process.

The thesis starts with a piece of history, how the first mobile phone is invented, who invented it, what kind of changes it has to go through to become a smartphone is all given in the first chapter. And before getting to know the modern form of smartphone, first generation is introduced with details. The third chapter is probably the most important chapter since it gives out strategies, compares and analyzes these strategies and then readers can see brands popularity among users. The fourth chapter brings viewers to the market shares fragments while the last one is about the future generation of smartphone.

Last but not least, a survey is done within a group of international students. The result is carefully analyzed to gain information about brand popularity and customer satisfaction. If in the fourth chapter, readers can know that Apple is the most popular brand worldwide then in this survey, this is proved to be true. However, Android users seem to be more satisfied with their products so that means it is still the number one rival to IOS. On the other hand, more people are likely to change to IOS than to Android. And last, others smartphone brands still have a chance to turn a new leaf for smartphone industry even though it will certainly be a long and rough road.

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THE SMARTPHONE SURVEY

1. **What is your gender?**
   - ○ Female
   - ○ Male

2. **What is your age?**
   - ○ 18-24
   - ○ 25-30
   - ○ 31-35
   - ○ 36-40

3. **Do you own a smartphone?**
   - ○ Yes
   - ○ No

4. **What brand is your current smartphone?**

(If you own more than one smartphone, please choose the one you use most frequently)

   - ○ Apple
   - ○ Samsung
   - ○ Sony
   - ○ HTC
   - ○ LG
   - ○ Nokia
   - ○ Huawei
   - ○ Xiaomi
   - ○ Blackberry
   - ○ Other: _____

5. **What will be the main reason when you choose a smartphone?**
   - ○ Screen size
   - ○ Operating system
   - ○ Price
   - ○ Display Size
   - ○ Battery Life
   - ○ Availability of Applications
   - ○ Brand
   - ○ Other: _____

6. **What is your favorite operating system?**
   - ○ IOS
   - ○ Android
   - ○ Symbian
   - ○ Blackberry OS
   - ○ Windows Phone
   - ○ Other: _____

7. **Are you satisfied with your current smartphone's operating system?**
   - ○ Yes
   - ○ No

8. **Are you planning to switch to another smartphone brand?**
   - ○ Yes
   - ○ No

9. **If so, which brand do you want to switch to?**
   - ○ Apple
   - ○ Samsung
   - ○ Nokia
   - ○ LG
   - ○ HTC
   - ○ Sony
   - ○ Blackberry
   - ○ Huawei
   - ○ Xiaomi
   - ○ Other: _____
   - ○

10. **What was the last time you update your smartphone?**
    - ○ Last week
    - ○ Last month
    - ○ Last year
    - ○ I don’t remember

11. **Based on your experience, how would you rate your satisfaction with the update?**
    - ○ Very dissatisfied
    - ○ Dissatisfied

- Satisfied
- Very Satisfied

QUESTIONNAIRE RESULT

1. **What is your gender?**

Gender	Frequency	Percentage
Female	15	75%
Male	5	25%
Total	**20**	**100%**

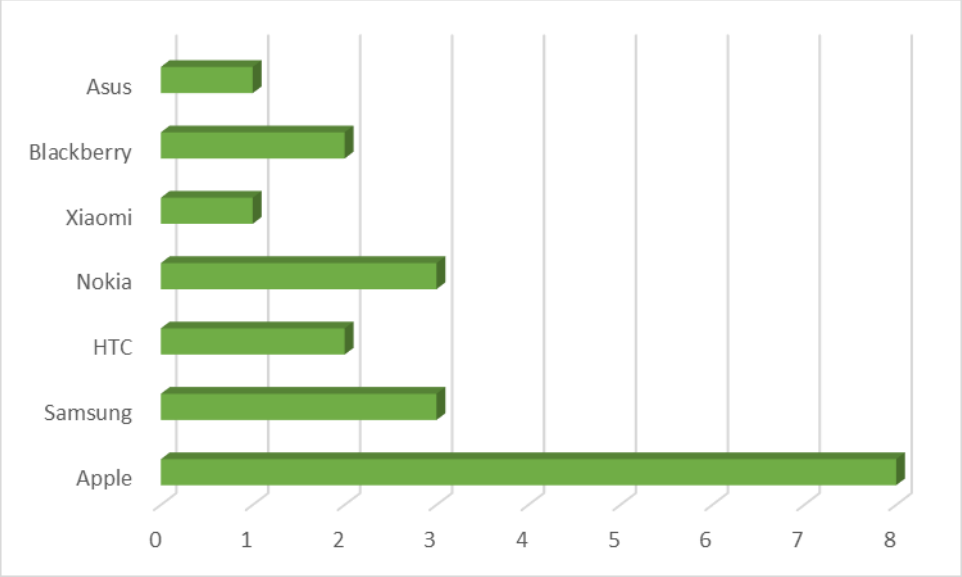
2. **What is your age**

	Frequency	Percentage
18-24	19	90%
25-30	0	0%
31-35	1	5%
36-40	0	0%

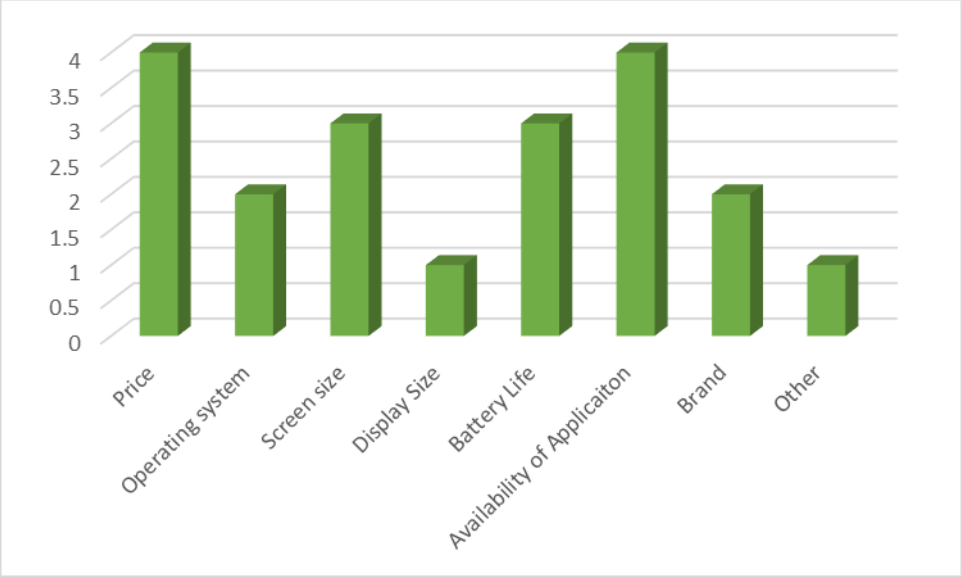
3. **Do you own a smartphone?**

	Frequency	Percentage
Yes	20	100%
No	0	0%

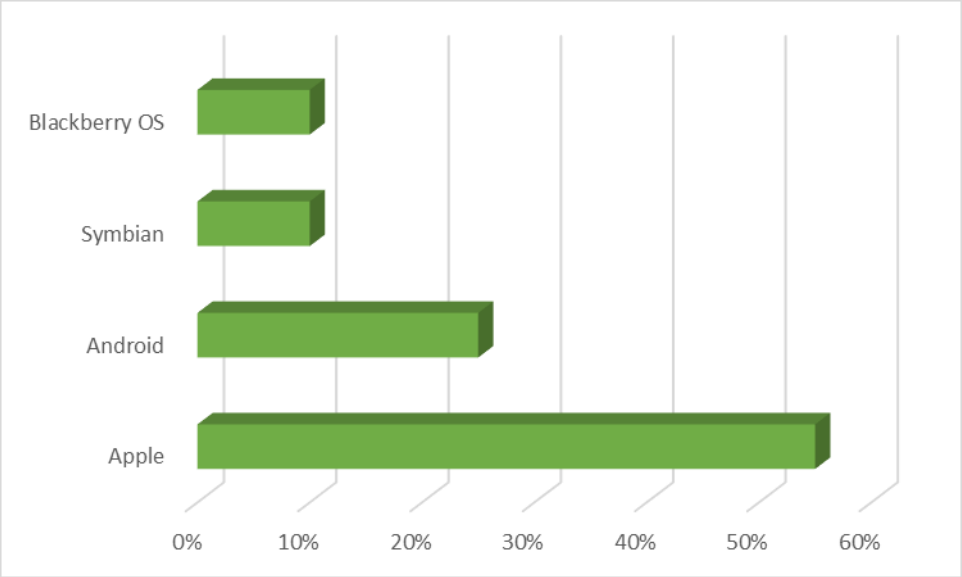
4. **What brand is your current smartphone?**



5. **What will be the main reason when you choose a smartphone?**



6. **What is your favorite operating system?**



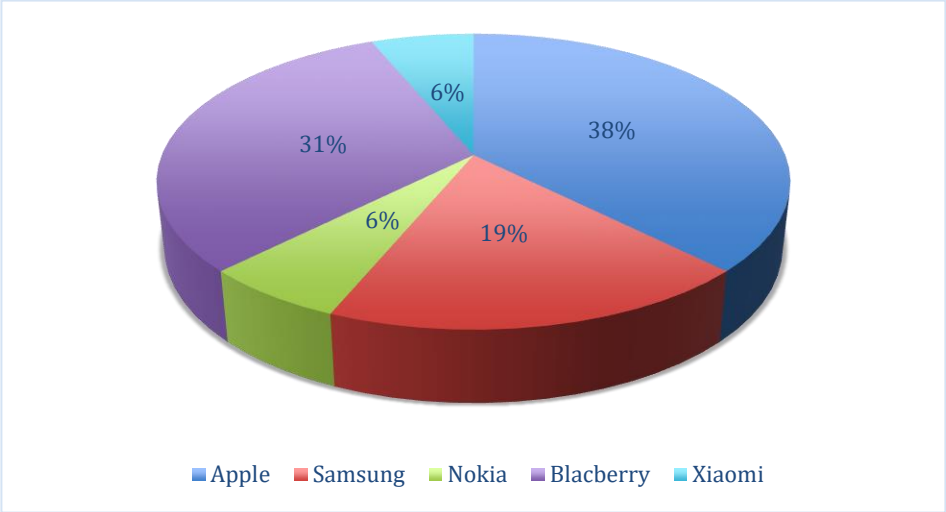
7. **Are you satisfied with your current smartphone's operating system?**

	Frequency	**Percentage**
Yes	13	65%
No	7	35%

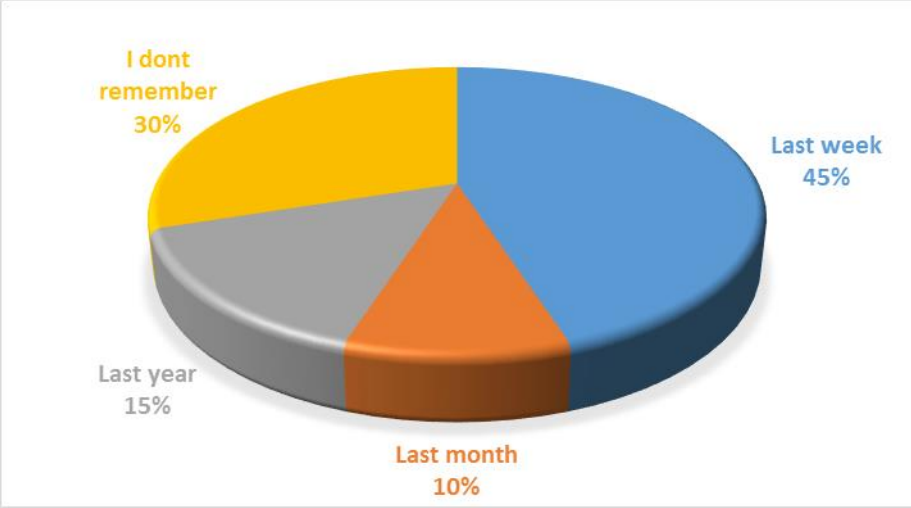
8. Are you planning to switch to another smartphone brand?

	Frequency	Percentage
Yes	8	40%
No	12	60%

9. If so, which brand do you want to switch to?



10. What was the last time you update your smartphone?



11. Based on your experience, how would you rate your satisfaction with the update?

	Frequency	Percentage
Very Satisfied	1	5%

Satisfied	14	75%
Dissatisfied	5	25%
Very Dissatisfied	0	0%