

TECHNOLOGICAL INNOVATION SENSITIVITY VERSUS PRICE SENSITIVITY OF SMARTPHONE CUSTOMERS; IPHONE CUSTOMERS IN FOCUS FOR THE PAST DECADE (2007-2017)

Kofi Amankwah Boamah, Ebenezer Agbozo

Abstract— The purpose of this study is to assess the iPhone customers' sensitivity to price, sensitivity to technological innovations for the past decade and compare their sensitivity to price to that of technological innovation worldwide. The data set is collected from www.apple.com and www.statista.com, no sampling method was used as using the whole data is the best way to present the true picture of the situation. A total of 12 specifications of iPhone data were collected from the period of 2007 to 2017. The findings revealed that customers are not sensitive to price in their purchasing decision, which indicates that customers buy more iPhones at initial higher price than at later dates when price is low. This was mostly the case in the period when the whole world faced financial crisis known as credit crunch. On the other hand, customers are more sensitive to technological innovations in their purchase decisions, by this, customers buy more of iPhone with a lot of advanced specifications. The findings of this study are limited by the number of iPhone specifications considered and price. This study is important for manufacturer of iPhone to understand the consumers' price and technological innovation sensitivity when it comes to purchase decision to be more competitive.

Index Terms— iPhone, Customer Sensitivity, Consumer Preferences, Price Sensitivity, Marketing, Smartphone Market, Technological Innovation.

1 INTRODUCTION

A smartphone is a mobile device with functionalities that go beyond making and receiving phone calls, text messages, and voice mails but also can allow user access to the internet and digital media such as picture, music and videos. It must also have the ability to make use of small computer programs known as applications or apps.

The smartphone market has grown rapidly in the past decade. With Apple's first introduction of its smartphone in 2007, the demand for smartphones in general has seen tremendous increase. With the current players in the industry such as Samsung, Apple, Nokia, LG, ZTE, Huawei, Lenovo, Sony, Motorola, HTC, BlackBerry, among others, the major pricing policy by Apple's iPhone product globally is mainly Skimming Pricing Strategy where the product is priced very high initially and then reduced in later stages. Technological innovation has become one of the key factors if manufacturers want to attract customers.

1.1 An Overview of the Smartphone Market and Competition Landscape

Recently, there has been fundamental shift in the structure and dynamic of global smartphone competition. Profit and market share margins have followed a similar or even worse path to those in the personal computer industry. The strategic significance of mobile technologies has made the smartphone market more complex and competitive.

Barriers to entry is no more a major problem as it has fallen significantly, making it possible for emerging manufacturers entering the market and also becoming a significant force in the industry. They are rapidly expanding beyond their borders, with the help of the advantages of low cost and the economies of scale because of the scale of their home market and supply chain proximity. This makes mass disruption possible in the industry.

Many phone-makers, including Nokia, Motorola, BlackBerry, LG and HTC have been forced to change their ways of operation to be able to compete with both the emerging as well as old players in the smartphone market. The right business model is now a key if a player wants to remain relevant in the global smartphone market. The inability of some players to meet these requirements has made them fall from their previous position in the industry. Notwithstanding this, some smartphones including Samsung and iPhone are still making significant progress in the smartphone market.

Some researchers have studied the price sensitivity of iPhone customers for a portion of this decade but not for the whole period. Also much has not been done on technological sensitivity of iPhone customers. With iPhone currently enjoying the highest percentage of the entire profit in the smartphone market, this paper intends to:

- Assess the sensitivity of iPhone customers to price on one hand,

- Assess the sensitivity of iPhone customers to technological innovation on the other hand and,
- Compare these two sensitiveness for a decade afterwards.

2 LITERATURE REVIEW

2.1 AN OVERVIEW OF APPLE INC.

Apple Inc., formerly Apple Computer, Inc., is a multinational corporation that creates consumer electronics, personal computers, servers, and computer software, and is a digital distributor of media content. Apple's core product lines are the iPhone smart phone, iPad tablet computer, iPod portable media players, and Macintosh computer line. Founders Steve Jobs and Steve Wozniak created Apple Computer on April 1, 1976, and incorporated the company on January 3, 1977, in Cupertino, California [25].

On the 29 June, 2007, the global mobile phone market witness a great revolution from no other company but Apple Inc. The company released its first smartphone into the world mobile phone market and since then, the entire mobile phone market has been influenced by that standard. Mobile phone manufacturing companies that have not taken the smartphone path are struggling to redeem their brands image in the market. Reduction in total global sales is also one of the consequences. Currently, there are fifteen different versions of iPhones since 2007 when the first iPhone entered the world market. Research has shown that technological innovation and price are the major factors buyers consider when buying smartphones.

According to Anthony [2], "a smartphone is a 4 inch device which performs as powerful like a heavy and big size laptop". It is able to do everything like a laptop, storing everything such as documents, photos, games and apps in one's pocket.

2.2 Factors Influencing Buying Behaviour of Mobile Phone Devices

"Consumer behaviour is influenced by social factors, such as the consumer's small groups, family, and social roles and status" [13].

Certain indicators are determinant factor influencing purchase decision. These factors include price, features, quality, brand name, durability, social factors and so on [27].

Karjaluoto et al. [11], pointed out that, price, brand, interface, and properties tends to have the most influential factors affecting the actual choice amongst mobile phone brands. Ling, Hwang and Salvendy [17] after surveying college students to identify their preference of their current mobile phone found out that, the physical appearance, size and menu organization of the mobile phones are the most determinant factors affect-

ing the choice of mobile phones. Mack and Sharples [18] concluded that usability is the most important determinant of mobile choice; other attributes particularly features, aesthetics and cost are other factors that have implication on the choice of mobile phone brand. To be precise, Saif et al, [22] selected four important factors i.e. price, size/shape, new technology features and brand name and analyzed their impact on consumers' buying behavior. Per his result, consumer's value new technology features as the most important variable that influences consumers' to go for a new mobile phone purchase decision. Pakola et al. [21] investigated on consumer purchasing motives in cellular phone markets, and their study revealed that while price and properties were the most influential factors affecting the purchase of a new mobile phone, price, audibility and friends' operator were considered as the most important in the choice of the mobile phone operator. Malasi [19] examined the influence of product attributes on mobile phone preference among undergraduate university students in Kenya. The study indicated various aspects of product and brand attributes such as color themes, visible name labels, and mobile phone with variety of models, packaging for safety, degree of awareness on safety issues, look and design of the phone were considered.

From all these literature, it is clear that consumer's value price and mobile phone features as the most important variable amongst others and they also acted as a motivational force that influences them to go for a mobile phone.

"Price is the amount of money charged for a product or service, or the sum of the values that customers exchange for the benefits of having or using the product or service" [13]. According to Chew [7], price has a significant impact on the purchase intention of Smartphone among young adults in UTAR, Perak, Malaysia.

2.3 Price Sensitivity of Smartphone Buyers

Customers accept prices within a certain range differently based on their individual financial strength and their perception about price in that range. A customer's perception of price and how he or she responses to price of products within this price range show whether a market is very price sensitive or not.

The concept of price elasticity is about how changes in price have a proportionally greater impact on demand for a product or not. A situation where changes in price have a proportionately greater effect on demand for a product is called Elastic demand, but if the effect on demand for a product is little then it is called inelastic demand. The concept of price elasticity basically illustrates the aggregate response of a market segment to price levels. Pricing strategies and buyers' responses to prices have received a great deal of scholarly attention [20].

2.4 Some Research Findings on Price Sensitivity

Price sensitivity refers to the extent to which individuals perceive and respond to changes or differences in prices for products or services [20]. Many researchers have mainly focused on routine decisions in response to changes in price [5] price format [8], or price framing [16]. Some researchers have examined price sensitivity as independent variable in relation to services [14]. Studies have shown that moderate usage customers are least sensitive compared to low-end users. Higher

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- Kofi Amankwah Boamah is currently pursuing a masters degree program in Applied Informatics in Ural Federal University, Russia.
E-mail: kofi.amankwah.boamah@gmail.com
 - Ebenezer Agbozo is currently pursuing a PhD in Informatics and Computing Techniques in Ural Federal University, Russia,
E-mail: eagbozo@urfu.ru

ing the choice of mobile phones. Mack and Sharples [18] concluded that usability is the most important determinant of

perceived price shows greater monetary loss for customers, which causes lower purchase intentions.

According to some research, consumers' evaluation of the value of a product is based on their perceptions that what they actually receive and what they expected of having it. Perceived value is the ratio of the perceived benefits of the goods or services to the perceived sacrifice in acquiring them. It is positively influenced by benefits on one hand, and negatively influenced by price on the other hand [9]. Consumers perceive the benefits of a good or service from different perspectives, among them are: functional, social, emotional, and conditional [24].

A research on price perceptions and adoption of innovations, found shopping innovators to be less price sensitive than laggards [10].

This means customers who consider innovation or advance features usually are not sensitive to price level.

Customers who are satisfied with products, buy such products again and again, and eventually become loyal to the brand. Loyal customers are insensitive to the price changes while non-loyal customers are sensitive to price changes in buying decision. Other past research are in line with loyal consumer's price insensitivity and non-loyal consumers' price sensitivity in buying decision [4] [25]. Some loyal consumers purchase the same brand repeatedly because of its nonmonetary features, whereas others do that in response to the attractive promotional offers [1].

Findings from September 2008 Consumer Spending Behavior Study conducted by Booz & Company for nearly 1,000 U.S. households as a results of the negative effects of credit crunch and other factors indicate that, the vast majority of consumers have already made substantial cuts in their spending—and expect to make deeper cuts given their gloomy outlook on the economy.

The research by Burt et al [6] in UK analysed and examined the impacts of financial crisis on the consumer buying behaviour, pointed out the following as factors that had direct impact on the consumer spending: job uncertainty, declining savings, increased risk aversion and lower disposable income. Their finding was that, because of these factor consumers restrained themselves from excessive spending as they used to and focused mostly on important thing [6].

3 METHODOLOGY

Secondary data from research publications, online business information, websites of Apple, Statista and other credible data sources were utilized. Both Quantitative and Qualitative methods were the main methods for this paper. To get accurate results after analysis the data used must be relevant and concise with little or no irrelevant data. To achieve this, graphs and charts were used where appropriate to visualize the data for easy comparison. The global quarterly unit sales for all kinds of iPhones till date were used to present the exact trend. Also, 12 criteria of smartphone specifications namely, Memory, Processor Speed, Camera Quality, System-on-Chip Used, Graphics, Latest release Operating System, Storage Capacity, Weight, Dimensions, Built-in Rechargeable Lithium-ion Battery Power, Display, and Connectivity, were presented in a tabular form and where applicable graphically as well to aid

in proper qualitative and quantitative analysis.

3.1 Data Collection and Analysis

The data set was collected from www.apple.com and www.statista.com, and no sampling method was used as using the whole data is the best way to present the true picture of the situation. A total of 12 specifications of iPhone data were collected for the period of 2007 to 2017.

For the analysis of the data, graphs in a form of bar graph and line graphs as well as pie charts were used. Microsoft Excel was the major software tool used. Based on the data, percentages were used for most of the comparisons of this study. Graphical presentation of data was also used for comparison. Bar and line graphs are used for inter-quarter unit of sales comparison while pie charts were used for intra-quarter unit sales comparison and analysis. Considering Skimming Pricing Strategy which is the major pricing strategy for iPhones against quarterly unit sales globally is the major tool for assessing customers' sensitivity to price. If an iPhone version records very high quantity of global sales unit in the quarter in which it was released and the immediate next quarter, then customers are not sensitive to price and vice versa.

On the other hand, technological innovation which is based on inter iPhone version specification comparison of 12 specifications namely, Processor Speed, Built-in Rechargeable Lithium-ion Battery Power, Camera Quality, Storage Capacity, System-on-Chip Used, Graphics, Latest release Operating System, Memory, Weight, Dimensions, , Display, and Connectivity, compared to worldwide quarterly unit sales of each version of iPhone is the basis for determining customers' sensitivity to technological innovation. If an iPhone version with very high specification, records very high quantity of global sales unit in the quarter in which it was released and the immediate next quarter, then customers are sensitive to technological innovation and vice versa.

4 RESEARCH FINDINGS

iPhone Model and Release date	1st gen: <i>June 29, 2007</i>
	3G: <i>July 11, 2008</i>
	3GS: <i>June 19, 2009</i>
	4: <i>June 24, 2010</i>
	4S: <i>October 14, 2011</i>
	5: <i>September 21, 2012</i>
	5C, 5S: <i>September 20, 2013</i>
	6 / 6 Plus: <i>September 19, 2014</i>
	6S / 6S Plus: <i>September 25, 2015</i>
	SE: <i>March 31, 2016</i>
7 / 7 Plus: <i>September 16, 2016</i>	

Table 1 iPhone model and release date

4.1 Global unit sales of iPhone 2007-2017

As can be seen from figure 1, generally, there has being growth in unit sales of every quarter from 2007 to 2017, but the rate at which each quarter grows differ. It must be noted

that, as the world witness financial distress in 2008, the comparison of unit sales for that year as well as that of 2009 to other years show a negative effect of the crisis. Also against many peoples' perception and general opinion, that the quarter where price is at the highest will record little global unit sales, in some cases it recorded higher global unit sales compared to other quarters per the computation of the decade. It must also be noted that, the date of release is very significant as in most cases iPhone is released at the later part of the quarter.

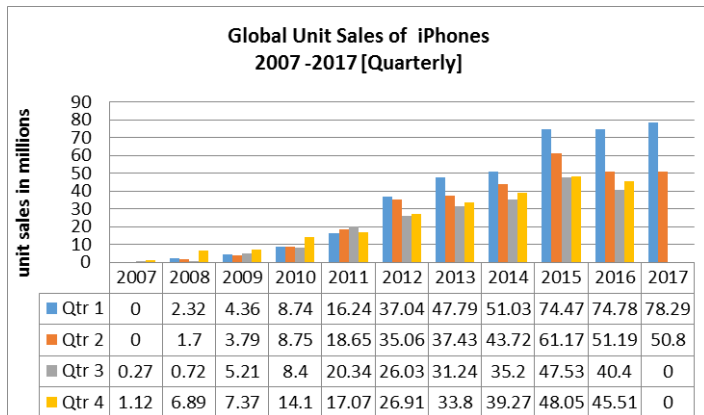


Fig. 1 Global unit sales of iPhone 2007-2017

The first quarter and the second quarter started with 2.32 million and 1.7 million global unit sales in 2008 and ended with 78.29 million and 50.8 million global unit sales in 2017 respectively.

In the same way, the third quarter and the fourth quarter started with 0.27 million and 1.12 million global unit sales in 2007 and ended with 40.4 million and 45.51 million global unit sales in 2016 respectively.

This is not a surprise as the population as well as the entire world economy has witnessed growth for the past decade.

This also shows that skimming pricing strategy was an appropriate pricing strategy for iPhone for some period of time within the past decade but not at any point in time.

4.2 Global Quarterly Unit Sales of iPhone 2007 - 2011.

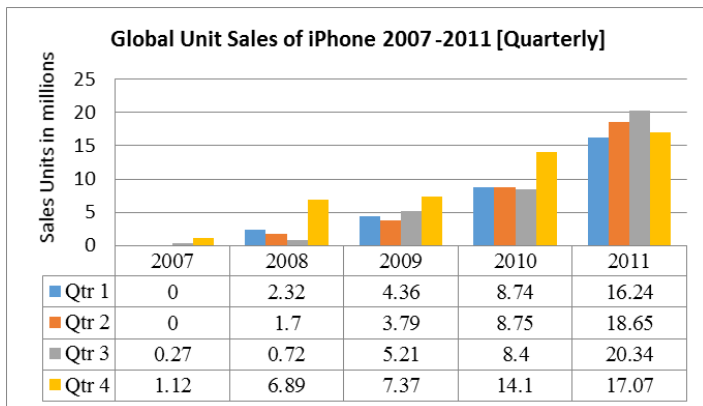


Fig. 2, Global Quarterly Unit Sales of iPhone 2007 to 2011

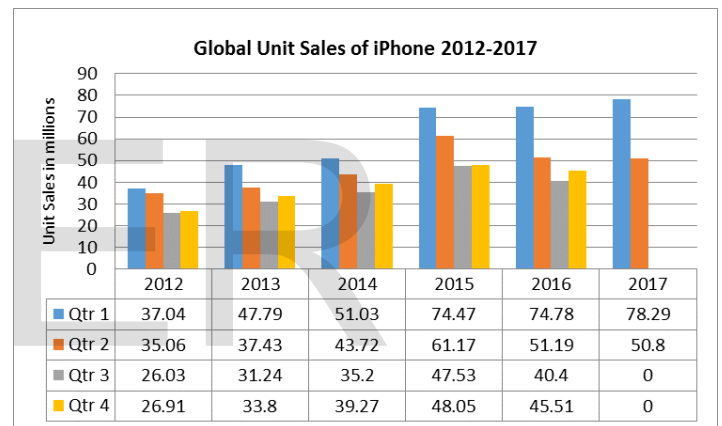
Figure 2 shows that, the highest values of 1.12 million, 6.89 million, 7.37 million, and 14.1 million units, for each year unit sales from 2007 to 2010 were made in the fourth quarter.

These findings shows that customers of iPhone were not too sensitive to price level as they bought more in the fourth and third quarter when most of the new iPhones were released with higher price but bought less in the second and first quarters when price was at its lowest. For instance in 2010 Apple released new iPhone (iPhone 4) on 24 June which is 6days to end the second quarter, but recoded the highest sales for that year was made in that quarter. Skimming pricing strategy was in some way the best strategy for the iPhone within this time space.

4.3 Global Unit Sales of iPhones 2012 -2017

Fig. 3 Global Unit Sales of iPhones 2012 -2017 in millions

As seen in Figure 3, the highest values of 37.04 million,



47.79 million, 51.03 million, 74.47 million, 74.78 million, and 78.29 million, for each year unit sales were made in the first quarter. Also it shows that the second quarter recoded the second highest values of unit sales.

A careful examination of the release date of iPhone shows that with the exception of iPhone SE that was released on March 31, 2016, all other new iPhone were released in the later part of the last month of the third quarter. This means the first quarter unit of sales from 2013 to 2017 must also be considered when assessing customers' price sensitivity.

These findings give an indication that, customers of iPhone were not sensitive to the level of price as they purchased more in the first quarter of 2013, 2014, 2015, 2016 and 2017 when price was still. Skimming pricing strategy was therefore an appropriate strategy for iPhone during this period.

4.4 Global Unit Sale of iPhone per Quarter in Percentage (2008)

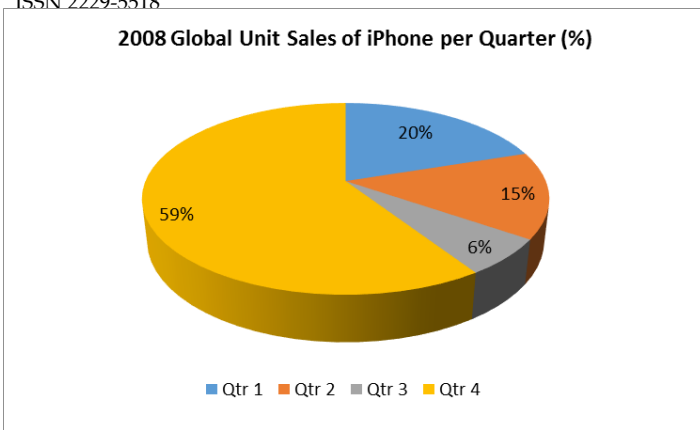


Fig. 4. 2008 Global Unit Sale of iPhone per Quarter (%).

Referring to Figure 4, we can see that a large proportion of the sales — 59% — took place in the fourth quarter of the year 2008, this makes 2008 one of the most price sensitive years for the decade. Because customers were too sensitive to price, they bought more than half of that year’s sales in the last quarter although the new iPhone was released as early as July 11, 2008. The third quarter recorded 6% the least of all in this year. These findings give a clear signal that customers were not sensitive to technological innovation as new iPhone introduced in the third quarter of the same year had much advanced features but did not generate much unit sales in the third quarter.

4.5 Global Unit Sales of iPhone per Quarter in percentage (2009)

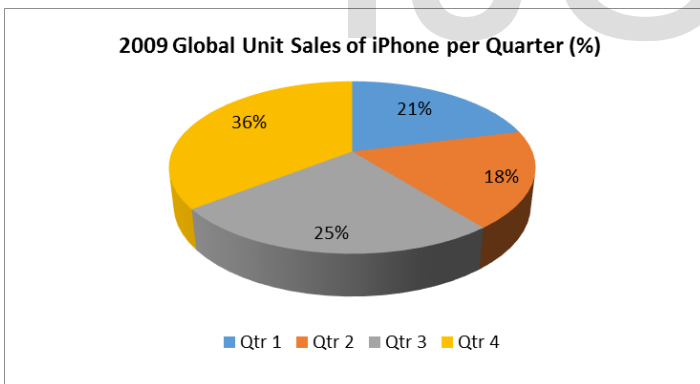


Fig. 5. Global Unit Sales per Quarter 2009

From Figure 5, only 18% and 25% of the total sales were made in the second and third quarters of 2009 respectively, irrespective of the fact that a new iPhone was released on June 19 (less than two weeks to end the second quarter). These findings point out that although iPhone customers were sensitive to price in 2008, the year the world experienced financial distress, they were not much sensitive to price in 2009 compared to the previous year’s buying pattern. It means that in line with some research findings, customers actually cut down their purchases in 2008 and 2009 due to the global negative effects of the credit crunch compared to the same quarter in previous year.

4.6 iPhone Technological Innovation Findings.

The technological innovations of iPhone are presented per the iPhone model using graphical method. Out of 12 specifications considered, Processor Speed, Built-in Rechargeable Lithium-ion Battery Power, Camera Quality, and Storage Capacity, were analyzed and graphically represented below.

4.6.1 iPhone processor speed (GHz)

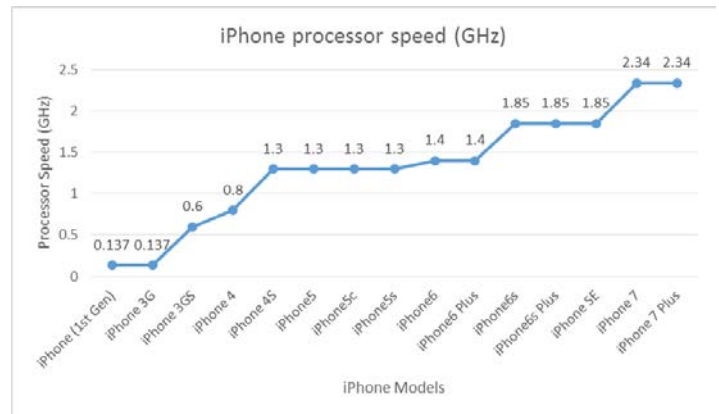
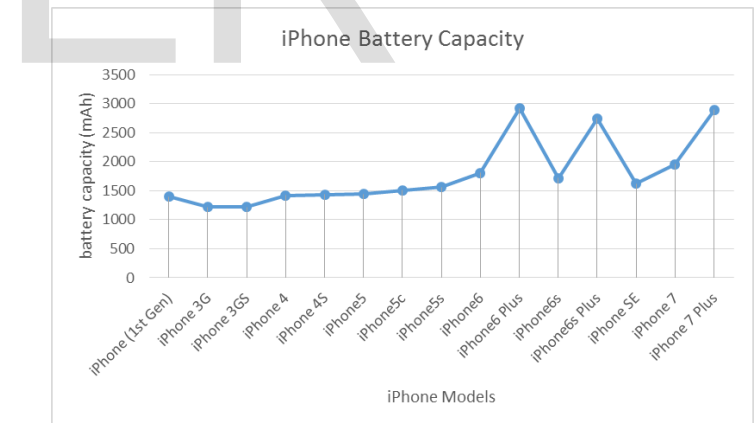


Fig. 6 iPhone processor speed

As depicted in figure 6, Apple improves upon the iPhone processor speed over time. This shows their never resting technological innovation ability in the smartphone market.



4.6.2 iPhone Battery Capacity

Fig. 7. iPhone Battery Capacity

Judging from figure 7, Apple neither maintains the iPhone Battery nor improved increase the new iPhone’s Battery Capacity as in the case of Figure 6, iPhone’s processor speed. On the contrary, some new iPhone released came with less Battery Capacity than those already in the market. Specific models that were affected are iPhone 6s, iPhone SE and iPhone 7.

4.6.3 iPhone on-board RAM

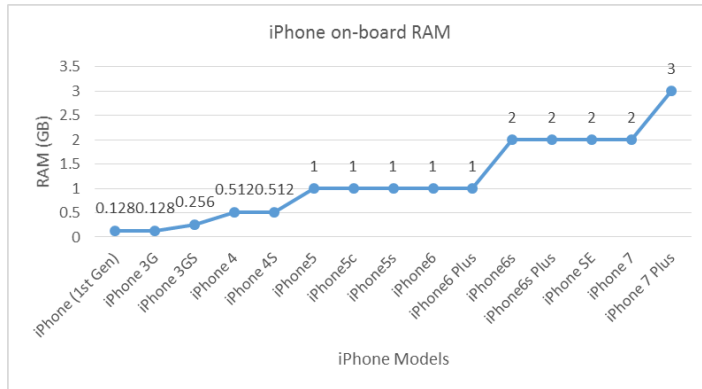


Fig. 8 iPhone on-board RAM

From figure 8, it is clear that Apple either maintains the iPhone on-board RAM or increase the on-board RAM of new releases. This also indicates how they always attack themselves in technological innovation in order to maintain their leadership position.

4.6.4 iPhone Camera Quality

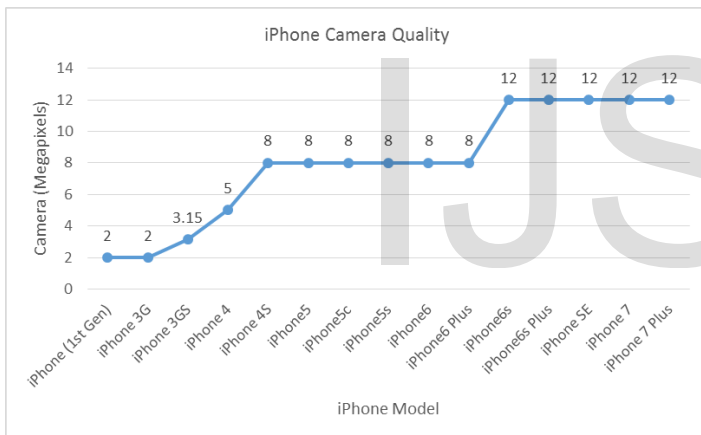


Fig. 9 iPhone Camera Quality

Examining figure 9, Apple either maintains the iPhone Camera Quality in megapixels or improve increase the new iPhone's Camera megapixel. This yet indicates that they portrayed higher technological innovations with each new iPhone released compared to those already in the smartphone market.

Referring to figures 6, 7, 8 and 9, a careful analysis indicates that with the exception of figure 7 where it is clear that, aside the iPhone 6s and iPhone SE which had Battery Capacity less than that of some of the previous version already in the market, Apple has shown drastic technological improvement and advancement in all their new iPhones released as compared to those already on the market. Each new iPhone comes with much technological innovation than the already existing model. The least Apple have done is maintaining some few specifications of already released iPhones in the new one. This means iPhone is able to meet the technological innovation demands of a significant portion of customers per each new iPhone released during the decade.

4.3 Comparison of Price and Technological Innovation Sensitiveness of iPhone Customers

It emerged per our findings that, between the period of 2007 and 2011, with the exception of 2008, iPhone Customers were not very sensitive to price but were rather sensitive to technological innovations. This is so because, although there were improvements in features of every new version of iPhone released sold at relatively high price during this period, significant unit sales were geared towards the quarter in which it is released and the next immediate quarter when price level is relatively high. That is, iPhone customers were only sensitive to price than technological innovation during the credit crunch period (i.e. 2008).

On the other hand, this was not the case from 2012 to 2017. During this period, iPhone customers were more sensitive to technological innovation but were insensitive to the level of price. This is clearly shown as very significant unit sales for this period took place in the quarter a new iPhone was released and the immediate quarter afterwards irrespective of the fact that the price of that iPhone release was at the highest. Thus, iPhone customers were more sensitive to technological innovation than price after the credit crunch period which has been the trend till date.

5 CONCLUSION

We have presented an overview of the global unit sales, specifications as well as the Pricing Strategy of Apple Inc.'s iPhone for the past decade. We also showed how it had made possible a positioning on the market with highest percentage of global smartphone market profit. For the iPhones, the company made use of Price Skimming which is a useful strategy and could be done when;

- Lowering the price would have only a minor effect on increasing sales volume and reducing unit costs.
- High price does not attract competitors.
- High price is interpreted as a sign of high quality, technological utility, status, etc. by customers.
- Enough prospective customers are willing to buy the product at the high price.

iPhone customers have been more sensitive to technological innovation compared to their sensitivity to price except during the global financial crisis period, 2008, for the past decade. Apple must therefore reconsider the technological innovation that gives significant value by manufacturing iPhones with very high specifications. Also, although customers are not sensitive to price, the company must change from Price Skimming to other better Pricing Strategy to make the product affordable to many. By doing so, the company will increase the iPhone's market share to minimize the current risk where if few customers switch, huge loss in profit can be recorded due to the fact that each customer represent a significant percentage of iPhone's total profit. Should the global economy experience another credit crunch, the company will perform well by adopting a different pricing strategy instead of skimming pricing since customers are likely to be too sensitive to price.

Apple Inc. apart from selling devices such as the iMac, Mac-

Book, iPod, iPad, iPhone, and Apple TV, the company is also through the internet selling services such as Apple Music and media such as music, books, software and applications.

ACKNOWLEDGEMENT

Our gratitude goes to the department of Systems Analysis and Decision Making under the Graduate School of Economics and Management, Ural Federal University for the use of their facilities during the development of this paper.

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