

*Full Length Research Paper*

# Smart phone services provisioning, assessing, development, management and tendency for mobile commerce

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Accepted 10 May, 2012

**The main objective of this research is to survey most of the currently available smart phones in the market. A modern technology has been changing with each passing day. For income and convenience, technology corporations expect that technologies can be created and innovated unceasingly to advance cell phones. Present smart phones make users take care of their friends anytime and anywhere, notice stocks' price fluctuation and every daily thing. This study adopted on-line questionnaire to research now cell phones-using tribes. Prevalence and styles of smart phones were investigated deeply and particularly. Market analysis and trend of smart phones can provide cell-phone manufacturing industry a reference of developing cell-phones. This study has implications and contributions on the basis of market analysis for businesses and researchers preparing mobile services and marketing.**

**Key words:** Smart phone, market commerce, electronic wallet, electronic payment, market analysis.

## INTRODUCTION

The highest transmission speed of third generation mobile communication (3G), issued in 2001, has reached 2Mbps. It can provide video, Global Positioning System (GPS), guidance system, surfing on-line, multimedia material downloading and so on. Additionally, 3.5G and Wi-Fi are in widespread use. As a result, smart phones are developed well and their functions possess the impression absolutely.

In scientific era with flowing information quickly, the definition of time for people is shorter and shorter. They are eager to connect with others without distance, and obtain the latest information anytime and anywhere. In ancient period, information must be delivered by manpower, but now only by a phone call or a message.

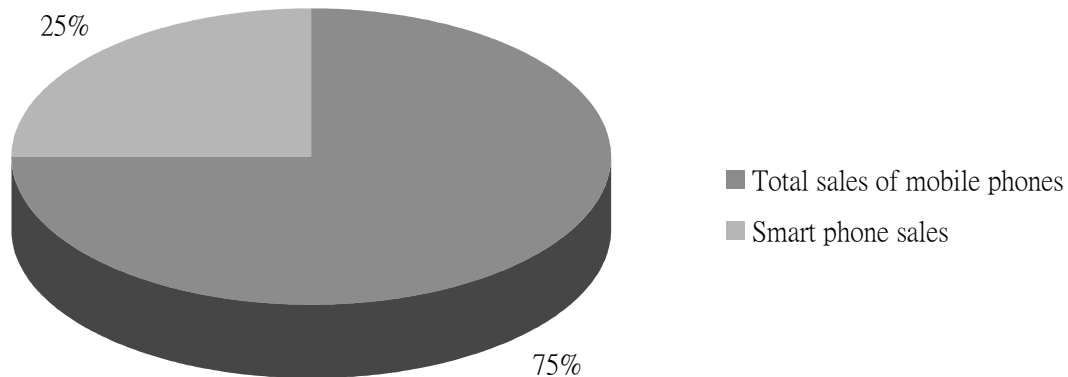
According to Figure 1, the sales volume of cell-phones around the world in the second season (Q2) in 2011 had

reached 4.28 hundred million. Smart phones held 25%, a quarter of cell-phone market. Many consumers are waiting for the latest advanced products with an impulse mood due to smart phone commercials and hearsay issued by factories and stores. More and more factories start to develop low-standard smart phones with few good functions. Since the prices of the afore-mentioned ones are inexpensive, they obtain good comments. At present, the main developing markets are located in Mainland China, India and Africa. Apparently, the speed of developing smart market is amazing.

P.S. Single-season sales volumes of cell phones are about 428,661,200 including smart phones. Sales volume of smart phones including all factories and stores are about 107, 740,400 and about 25% in whole sales volume.

There has been increasing interest in communication techniques and their applications in recent years, such as robot manipulation (Hsiao et al., 2005a, b, c, d, e; Chen et al., 2011a, b; Chen and Huang, 2011; Shih et al.,

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**Figure 1.** Present global sales volume of cell phone and market share of smart phone in the second season in 2011.

2011a, b; Lee et al., 2011a, b, c), engineering application (Lu, 2003; Amini and Vahdani, 2008; Chang et al., 2008; Chen, 2006; Chen et al., 2008d, e; Trabia et al., 2008; Tu et al., 2008; Yang et al., 2008a; Shih et al., 2010b; Yeh and Chen, 2010; Cakiroglu et al., 2010; Kucuksille et al., 2010; Shamshirb et al., 2010; Uddin et al., 2010), architectural engineering (Chen et al., 2004, 2010i; Hsieh et al., 2006; Chen, 2010a, b, c, 2011c, d, e; Hsu et al., 2010; Chen et al., 2011c, d; Liu et al., 2011; Tang et al., 2011), satellite observations (Lin et al., 2009a, b; Lin and Chen, 2010b; Lin and Chen, 2011; Yeh et al., 2011), marine research (Chen et al., 2005a, b, 2006a, b, c, 2007a, b, c, d, e, f, g, h, 2008a, b, c, 2009c; Tseng et al., 2009; Chen, 2009b, c, 2010d, 2011a, b, c), network optimization (Chen et al., 2009g; Chen and Chen, 2010b; Shih et al., 2010a, c; Kuo et al., 2010, 2011; Kuo and Chen, 2011a, b), system development (Chen, 2009a; Chen et al., 2009a, b, d, e, f; Chen, 2010c; Chen et al., 2010a, c, d, f; Lin and Chen, 2010a; Shih et al., 2011d; Tseng et al., 2011), educational improvement (Chen et al., 2010b; Shih et al., 2010d; Shen et al., 2011; Shih et al., 2011c; Chen, 2011f) and managements on leisure and tourism industries (Yildirim et al., 2009; Zhao et al., 2009; Tsai et al., 2008; Yang et al., 2008b; Yeh et al., 2008; Chen 2010a; Chen et al., 2010e, g, h; Lee et al., 2010a, b; Chiang et al., 2010; Tsai and Chen, 2010; Tsai and Chen, 2011; Yu et al., 2011; Chen et al., 2011e). Lee et al. (2011) identify the relationships between importance and satisfaction and to uncover the characteristics of mobile advertisements through smart phones using the Importance-performance Analysis (IPA) methodology in the Web(2) environment. Liutkevicius et al. (2011) presents the distributed service development and provisioning framework, which is designed to develop, provide, monitor and control various types of existing and future smart home applications and services. The purpose of this study is to explore the virtual market formed by submitting plenty of application programs produced from open-ended operating system (OS)

adopted by smart phones. The developing characteristics, goals and styles of smart phones in the future are also discussed.

## LITERATURE REVIEW

### Operating system (OS) of smart phone

Major mobile phone manufacturers now have their operating systems and platforms for decision-making and considerations on the future strategy. Figure 2 shows the 2008 to 2010 operating system market share. This is the current major operating system in the 2011 market.

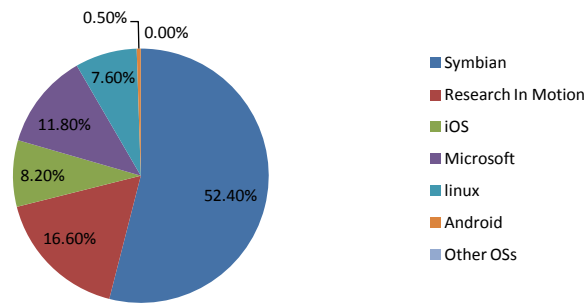
#### Symbian

The earlier rise OS was created by Symbian which was formed by psion, Nokia, Sony Ericsson and Motorola in 1998. Nokia possessed 48% stocks and bought the rest stocks in June in 2008. Furthermore, it established Symbian foundation. Many main factories and stores such as Nokia, Sony Ericsson, Motorola, LG, and Samsung and so on participated.

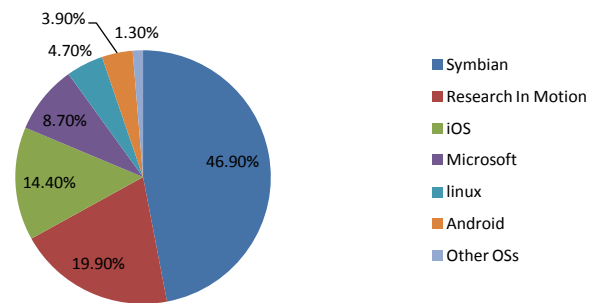
#### iOS

The most popular operating system provided for iPhone system is originally named iPhone OS created by Apple. The follow-on products, like iPod touch, iPad, Apple TV, also apply it. That is the reason why the sales volumes of Apple cell phones and OS were not a geometric ratio. iOS is based on Darwin (open source OS), and is the same with Mac OS X, exclusive OS, developed for Mac. In June 7 in 2010, its name was changed to be iOS announced in Apple Worldwide Developers Conference (WWDC).

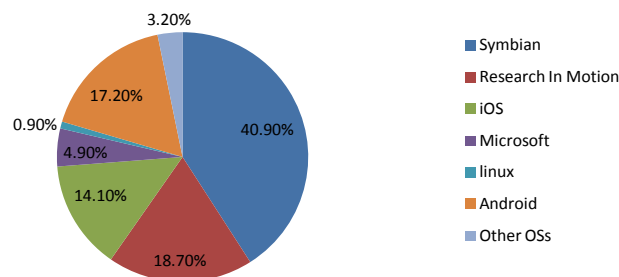
### Operating system market share in 2008



### Operating system market share in 2009



### Operating system market share in 2010



**Figure 2.** Marketing percentage of operating system (OS) from 2008 to 2010.

Under this OS, iPhone, iPod touch and iPad adopted multitouch interface are only touched lightly with man's fingers. The programs installed in those devices can be controlled by fingers in sliding, rotating and enlarging the screen. In January 27 in 2010, iPad announced by Steve Jobs subverted the inherent concept of a tablet PC and looked like an enlarged iPod touch. After being using, it was praised by consumers for its perfect functions, such as on-line suffering, e-mail, social group network, games, multimedia broadcasting and so on, and obtained the annual gold medal product in 2010.

The central processing unit employed by iPhone, iPod touch is framed by ARM. App store is the only place to obtain its complete install software. The closed limit caused makes a serial of disturbances and many consumers want to break it. A huge potential change-machine market was opened. The afore-mentioned condition is called "Jailbreak". Apple's attitude to Jailbreak is tough and do not yield to the third part. While changed iPhone and iPod touch carry on synchronizing with App store, they will be cleaned and return to default value set by the original manufacturer.

#### Android

Android OS was created by Andy Rubin and merged by Google in 2005. Android is base on Linux OS. Linux itself

possesses a complete and abundant opened system with low authorized software, and is popular with the third software developer. After merging, Google developed many functions like fixed position, message, cell phone search strategy and so on by Linux platform. In 2010, Android was kicked out from the core by Linux pathfinder. Henceforth, Linux quits partnership with Android.

Since Android was based on Linux OS, adopted on limitless source strategy after being merged by Google, and possessed many self-decision and open-end characteristics, the safety and privacy are disclosure relatively. Google, many factories and stores formed open handset alliance. At present, there are some cell phone companies, like HTC, Samsung, Motorola, Sony Ericsson, LG and so on, adopting Android.

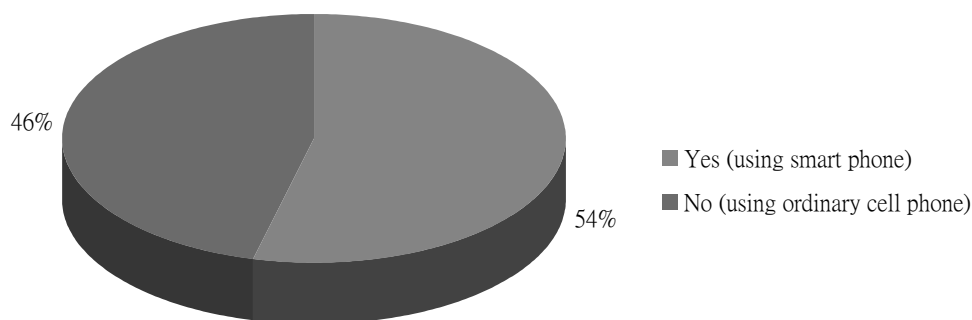
The companies adopting Android invest in low standards smart phone, expand the low purchasing power market and win the high praise. In 2010, the amazing growth rate of sales volume of Android-system cell phones reached 888.8%. It became the second selling OS. In the early first season in 2011, it had surpassed Symbian and became the first selling OS. It is even an amazing dark horse with high growth.

#### APP market

Not only open-end Google but also closed-end Apple

**Table 1.** Questionnaire statistics.

Item	Gender	Sample number	Percentage
Gender	Men	56	57.73
	Women	41	42.27
Age	Under 20	10	10.3
	Between 21 and 30	35	36
	Between 31 and 40	31	38.14
	Between 41 to 50	21	15.56
Educational background	Under senior high school and vocational high school (included)	20	20.61
	College and university	55	56.70
	Above graduate school(included)	22	22.68

**Figure 3.** Percentage of smart phone possessed.

provide the certain service to let App factories or owners possessed smart phone deliver finished-products to the platform. After being examined and charged by companies, providers can sale them with setting price voluntarily or without payment. Since Google's Android system language is easily learnt and low exploitation, slotting fee is relatively lower and fit to an individual or small and medium-sized enterprises. The profit of selling products is divided into two parts, one is three and the other is seven. Apple provided thirty percent of profit. Google feedback to local telecommunication entrepreneur. Both all of them want to attract more factories and stores.

The selling pattern to APP is mainly divided into two types:

- (1) Charge directly and define the cost by the program contents and service.
- (2) Download free and charge from advertisements indirectly.

In APP commercial development, the most outstanding story is that angry bird, the most popular game, created by Rovio Entertainment, a Finland game development company with under 20 employees, in App store of

iPhone in 2009. Angry bird with simple operation, cute and interesting frame and promoting difficulty followed by advanced checkpoints is popular and fashionable around the world. Until now, it is downloaded over 5 hundred million times. Since its fee of downloading is 0.99 dollars, the public of loving it or being curious about it did not feel waste money. Viewing the downloading times, contributions provided by the mass are very significant. The income of this company had reached 80000000 dollars. Besides, after being sold well, the peripheral commodities of this game were also popular fervently.

## RESEARCH METHODS

### Data collection

This research employed the questionnaire about smart phone to 150 users to realize their basic concept and impression. Among 110 questionnaires retrieved, the valid ones are 97. Table1 is about participant's basic information.

### Analysis of questionnaire

From Figure 3, the percentage of smart phones possessed was over 50% in 2011. Market grew fast and fast, and the possess

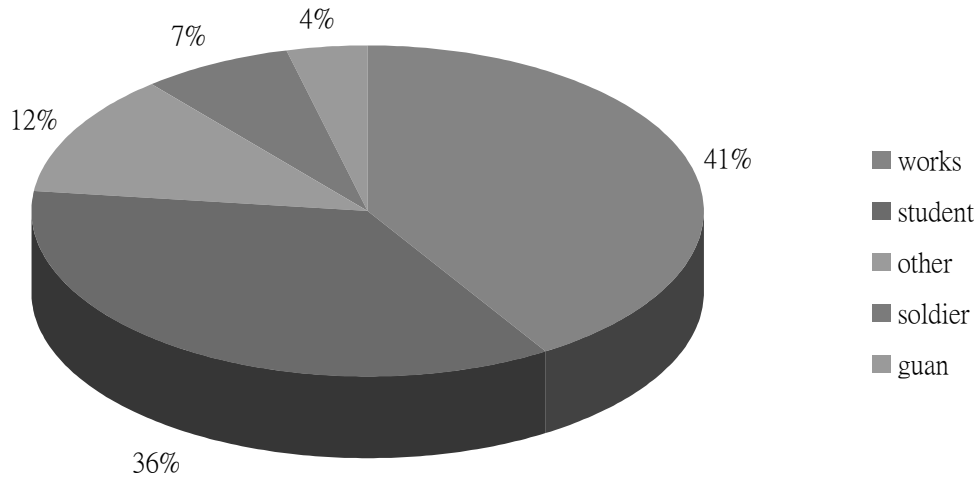


Figure 4. Identification of using the smart phone.

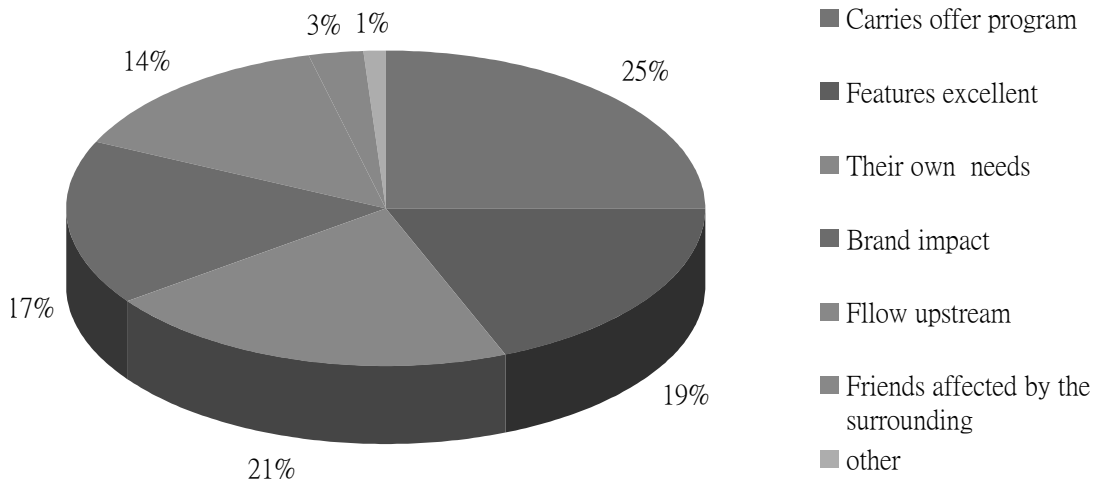


Figure 5. Reasons why to buy the smart phone.

percentage of smart phones in the future would be closer to 100% stated by many social relative electron report. That is, the people might own their personal smart phone in the future.

From Figure 4, it shows that most users are office workers and students. Maybe most office workers purchase the smart phone because of their economic capacity, work need or multimedia functions. Students might be affected by driving of the trend, friends, classmates or star effect market which cannot be ignore.

From Figure 5, most persons purchased smart phones because of benefit plan provided by telecommunication entrepreneur and the outstanding functions. The afore-mentioned reasons hold 61%. The benefit plan provided by telecommunication entrepreneur make consumers, whose contract to cell phone are expired, purchase smart phones willingly.

According analysis of investigation, most people who purchase smart phone because of its excellent functions are office workers. Consumers presented multi-function smart phones are fit to deal business and miscellaneous schedules. In the convenience of wireless network, consumers who are busy in their business can purchase something on-line and pay the bill. They not only enjoy

some benefit but also research some consultation with facility.

From Figure 6, Apple iPhone and homegrown HTC own over 60%. iPhone not only promotes smart phones but also is expressed into popular feeling by its simple and open-handed interface. In the keen touch and smooth process, iPhone is prior to other brand smart phones. Its merit cultivates a lot of loyal consumers of Apple products. While iPhone was selling initially, Taiwanese even were unable to book one. While it started selling practically, it was often in short supply. A number of consumers who could not purchase iPhones bought HTC or other brand cell phones. According to the consumers who bought HTC, they presented that it did not be more fashionable than iPhone, but it was easy to repair. Its OS was open-ended and its high compatibility could be interlinked with many OS platforms. Mainly, HTC was cheaper than iPhone.

In the investigation, the willingness of purchasing iPhone is certain high. Most consumers who has not purchased are waiting for iPhone4S and iPhone5 which are going to sell. iPhone4S and iPhone4 are almost same, but in abroad the death of Steven Jobs, the former Chief Executive Officer (CEO) of Apple, brought the sale of iPhone4S to life. Only single day sales volume was amazing.

### sale

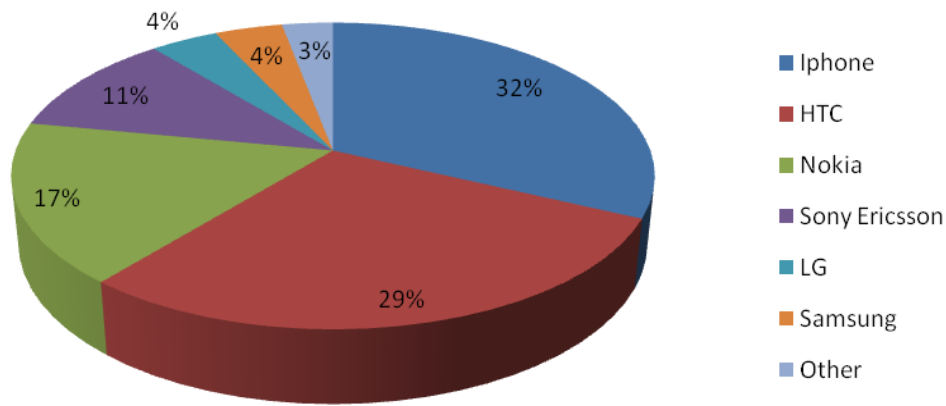


Figure 6. Trademarks which are existent or purchased in the future.

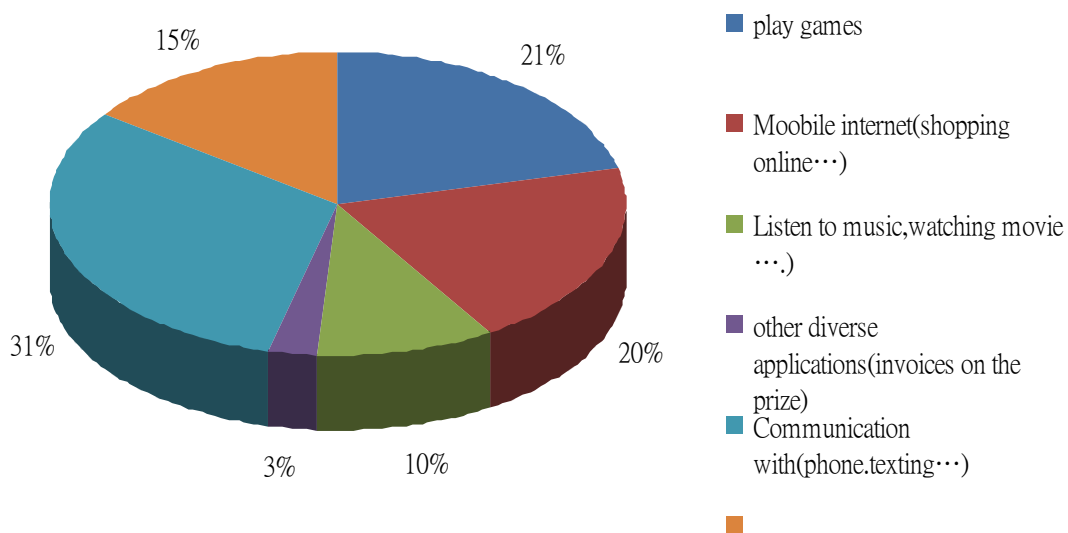


Figure 7. Functions of the smart phone used by consumers.

Figure 7 shows that certain functions were applied by most users. Communication held 31%. Playing games and mobile internet held 41%. In investigation, mobile internet was almost employed by office workers. Few consumers expressed that they seldom used mobile internet because of internet procrastination or individual information release. However, most consumers were willing to employ the mobile internet since it was real convenient.

Figure 8 shows that the accepted cost for most persons is between 10 to 15 thousand NT dollars. At present market, the cost of solo smart phone is around 8 to 13 thousands NT dollars without extending the contract, collocating new cellphone providers or other preferences provided by telecommunication business in contracted clauses. The primary products of HTC, iPhone and other factories cost over 12 or 2 thousands NT dollars. Apparently, most people are willing to purchase smart phones under the premise that preference plans are carried out. The investigation shows smart phones will

enlarge the low-price market with beating the price war. More and more preference plans about relative products might be implemented. Further, the present smart phone market will be kept growing.

Samsung, a Korea factory, has been prior to others and promoted the low-standard smart phone market. Due to open-ended OS and the price solution of monocrystal chip, it can provide the low-standard smart phones. In Mainland China and Latin America, it obtains high praise. Homegrown HTC also start to sell economy smart phones by low-price market primarily. Its standard is not high, but it can support every mobile value-added service provided by telecommunication entrepreneur. Hope to open the new developing markets in India, Southeast Asia, etc.

From Figure 9, most consumers who had used smart phones would purchase it again. Their willingness reaches 96%. Most of them expressed that they were used to smart phones and even

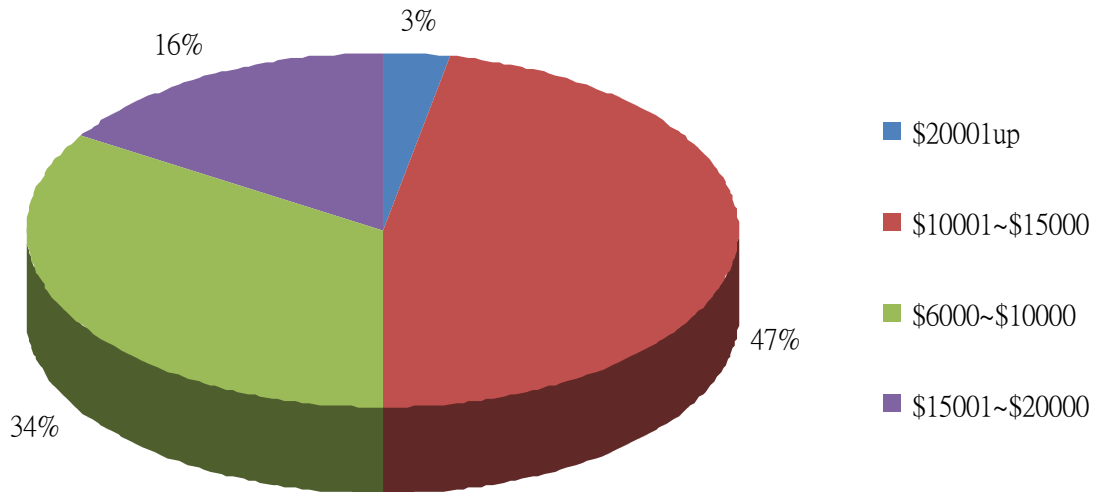


Figure 8. Cost range accepted by consumers.

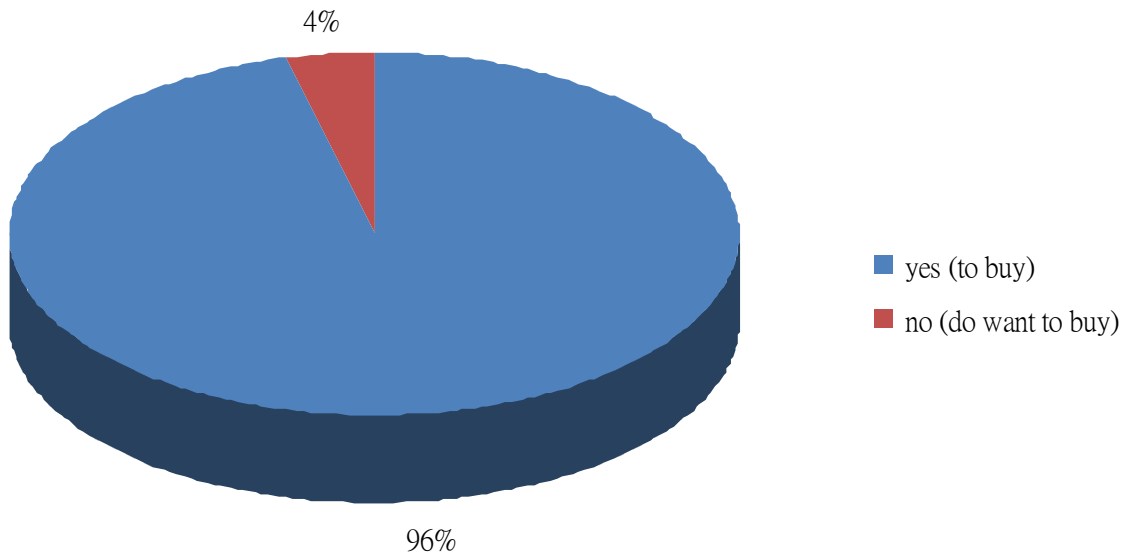


Figure 9. Idea whether the smart phone is eliminated through competition, it would be purchased or not.

loved to use touch interface. The functions of smart phones are closer to computers'. With prevalence of 3G network and Wi-Fi, it is convenient for the people to suffer wireless internet anytime and obtain changeable information. Word processing, GPS and guidebook in smart phones are excellent and practical and loved by most consumers who are very fond of traveling. In entertainment, it can be used to pay the bill and purchase for a bustle people to save plenty of time. So to speak, most consumers love this kind of disposable expense which let them enjoy many services.

Few people who did not keep purchasing smart phone thought the prices of smart phones are still too high, and did not want to be tied by contract due to purchase. Hence, an ordinary cell-phone might be chosen next time. It is a suggestion for every main smart phone factories and stores that selling plan signed with telecommunication entrepreneur needs to be improved to satisfy most needs of consumers from different levels.

From Figures 10 and 11, if ordinary cell phones weed out in the

future, consumers will purchase smart phones. The aforementioned condition has showed around 77%. Hence, smart phone market might be significant in the future.

That consumer who is unwilling to purchase smart phones holds 23%. According the investigation, most of the afore-mentioned consumers are conservative middle-ager persons and the aged who do not need high-functional cell-phones and are used to ordinary cell-phones with push buttons. Additionally, those still deem that smart phones are luxury and complicated electronic products. Since they reject to try or accept new things, their purchase willingness is relatively low. That the rest ones are office workers or students who might consider the smart phones as expensive, wait for new types of smart phones, or others factors holds 39%. Perhaps factories, stores and telecommunication entrepreneur should promote a special preference for students and office workers. Their commercial and sales promotion should be simple and generous to attract middle-ager persons and the aged.

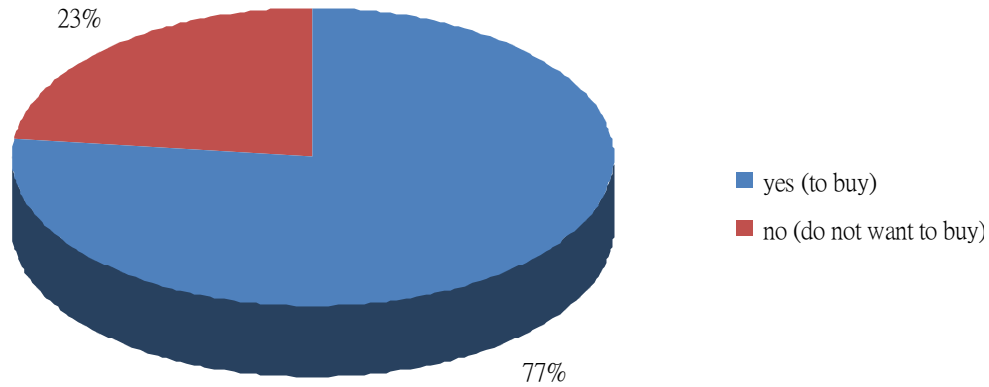


Figure 10. Idea of whether to buy or not to buy the smart phone in the future.

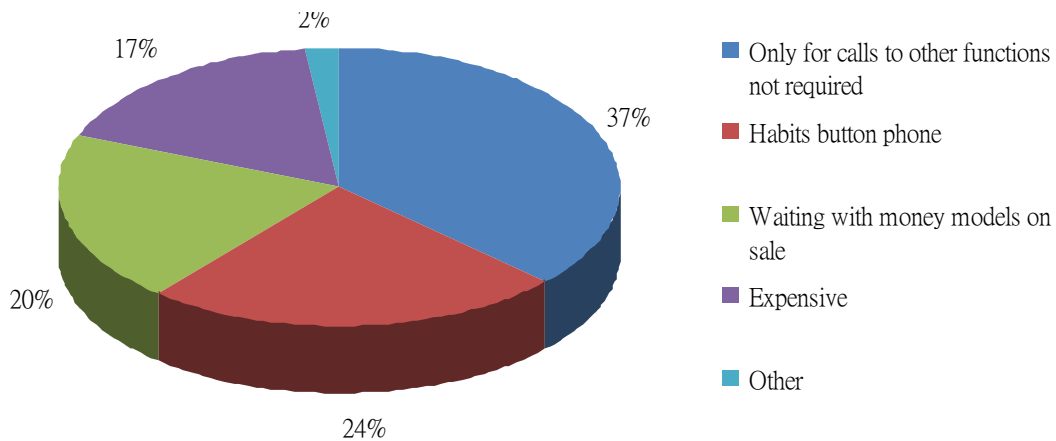


Figure 11. Reasons for not buy the smart phone.

**Conclusion**

From this study about the usage and need of the smart phone for the mass, the followings are some results:

- (1) In this investigation, 54% of all targets expressed that they has or had used smart phones.
- (2) In this investigation, 41% of all targets are office workers, 36% are students. Both of them holds 77%.
- (3) In impression of purchasing factors, due to different occupations consumers will choose distinct smart phones or ordinary cell phones. 78% of office workers take smart phones' excellent functions and their needs into account to purchase their smart phones. Others purchase smart phones up to preferences provided by telecommunication entrepreneur or a fondness to certain brand.
- (4) In this investigation to brands purchased possibly, NOKIA and Sony Erisson held 17% and 11% repetitively in low and middle price cell-phone market. In smart phone market, Apple with good brand image and millions of applications holds 32%. HTC with open-ended

- program code and good software compatibility makes itself become a representative in commerce cell phones. It holds 29%. In the future, the more lives integrated into a certain cell-phone, the more occupational ratio it will hold in cell-phone market.
- (5) In the functions consumers have used most often, communication (call, message, video), play games and mobile internet hold 31, 21 and 20% repetitively. It means smart phones have integrated with cell phones, handheld game player and on-line devices with wireless network card. In the future, if smart phones can replace more things, it will hold bigger market.
- (6) In the price accepted by consumers, 10001 to 15000 and 60000 to 10000NT dollars are 47 and 34% repetitively. Consumers take contracts and preferences provided by telecommunication entrepreneur into account. In the market conditions, most consumers will not choose around 6000NT dollars smart-like phone with low-standard. They will purchase smart phone with the same level like the afore-mentioned one.
- (7) While consumers weeded their cell-phones out, 96%



of consumers will keep using smart phones. It means smart phones have been accepted by different age-level people gradually.

(8) Among consumers, the main tribe is senior. They would not purchase smart phones due to high prices. They have been accustomed to using key-based mobile phone, smart phone that is relatively new kind of technology products and more afraid to try. And smart phone prices are pretty expensive, so it cannot easily be purchased.

For the tribe of using cell phones, the commercial of promoting smart phones can emphasize on integrating PDA with cell-phone, and its convenience to highlight its especial functions like entertainment, information process platform. The paper suggests the hardware of cell-phones, speed of process and frame with good scientific sense are advanced to attract the tribe with age 16 to 35.

## ACKNOWLEDGMENTS

The authors are appreciative of the financial support in the form of research grants to Dr. Chen-Yuan Chen from the National Science Council, Taiwan under Grant Nos. NSC 100-2628-E-153-001, NSC 100-3114-C-153-001-ES, and NSC 101-2221-E-153-001-MY2. The authors are also most grateful for the kind assistance of Editor of AJBM, and for the constructive suggestions from the anonymous reviewers, all of which has led to the making of several corrections and have greatly aided us to improve the presentation of this paper.

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