Disruptive Technologies, Innovation and Global Redesign:

Emerging Implications

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Chapter 26
Dual-SIM Phones:
A Disruptive Technology?

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ABSTRACT

Dual-SIM mobile phones utilize technology that permits the use of two SIMs at a time. The technology permits simultaneous access to the mobile network services. Its disruptive nature is with reference to the mobile phone market in Nigeria and other parts of the world. Earlier market trend was inclination to "newer" and "better" phones, in favour of established single-SIM mobile phone manufacturers like Nokia and Samsung. Introduction of dual-SIM phones mainly manufactured by Chinese mobile phone manufacturing firms propelled user preference for phones acquisition which permits dual and simultaneous access to mobile network. This technology has compelled its adoption by established manufacturing names in order that they may remain competitive. It is a clear case of a disruptive technology, and this chapter focuses on it need, effects, and disruptive nature.

1.0 INTRODUCTION

Christensen (1997) used the term "*disruptive technology*" in his book *The Innovator's Dilemma*. Such technologies surprise the market by generating a considerable improvement over existing technology, and this can be attained in a number of ways. This technology may not be as expensive as an existing technology or more complicated in nature but does attract more potential users (www.wisegeek.com). At times it may be expensive and complicated, requiring highly skilled personnel and infrastructure to implement. Two types of technology change have shown dif-

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ferent effects on the industry leaders. *Sustained technology* sustains the rate of improvement in a *product's performance* in the industry. Dominant industry firms are always at the fore developing and adopting such technologies. *Disruptive technology* changes or disrupts the performance path and continually results in the failure of the industry leading firms. Few technologies are basically or essentially disruptive or sustaining in nature. It's the impact created by the strategy or business model that the technology enables that is disruptive (Christensen & Raynor 2003). The advent of Global System for Mobile communication (GSM) resulted in a major communication leap worldwide. Mobile phones actually became an indispensible electronic gadget defining the modern world (Sally, Sebire, Riddington, 2010). Mobile phone manufacturers continue to include different features on their mobile phone products in addition to basic functions of communication. This is with a purpose of sustaining the market for the products. The mobile phone has become a gadget with full range of services. Ranging from basic telephony to business and leisure or entertainment features. However, performance issues with mobile network services furnished further basis for multiple SIM (Subscriber Identity Module) acquisition by users, for improved access. The problems that led to this were initially poor network coverage and poor performance problems of mobile network service providers in the country and later lower call tariff. Mobile phone users acquired phones depending on the number of networks to which they were subscribed and the trend still exists today. An opportunity was created for a product that would satisfy user needs with regard to multiple SIM capabilities.

1.1 History of Mobile Phone

The history of mobile phone began in the 1920s. The very first usage of it was in taxis/cars where it was used as a two-way radio for communication. Cell phones evolved over time like any other electronic equipment, and each stage or era was most certainly interesting. From its first official use by the Swedish police in 1946 to connecting a hand-held phone to the central telephone network, modern cell phones evolved tremendously. Ring (1947) created a communication architecture of hexagonal cells for cell phones. Later an engineer discovered that cell towers can both transmit and receive signal in three different directions led to further advancement. Early cell phone users were limited to certain blocks of area often referring to base stations covering a small land area. It was not possible to remain in reach beyond such defined boundaries until Joel's development of handoff system. By this, users were enabled to roam freely across cell areas without interruption to their calls. Cell phone had analog services between 1982 and 1990. In 1990, Advanced Mobile Phone Services (AMPS) turned the analog services to digital and went online ("History of Cell Phone" 2010).

1.1.1 First Generation (1G) Mobile Phones

The USA Federal Communication Commission (FCC) approved for public use the first cell phone called Motorola DynaTAC 8000X from Motorola but was made available to the public market after 15 years and was developed by Dr. Martin Cooper. It was considered to be a lightweight cell phone of about 28 ounces. Its dimensions were 13 x 1.75 x 3.5 inches. First generation mobile phones worked with the Frequency Division Multiple Access (FDMA) technology. The first generation mobiles are large in size and heavy to carry. First generation mobile phones were used only for the voice communication purpose("History of Cell Phone" 2010).

1.1.2 Second Generation (2G) Mobile Phones

The second generation mobile phones were introduced in the 1990s. Second generation (2G)

mobile phones worked with both GSM and CDMA (Code Division Multiple Access) technologies. 2G network signals are digital while 1G network signals are analog. 2G cell phones were smaller, weighing between 100 to 200 grams; these were hand-held and were portable. Later improvements on these cell phones included faster internet access with GPRS (General Packet Radio Service) and subsequently, EGDE (Enhanced Data rates for Global Evolution) technology. And sharing of files with other mobile devices using infra red or Bluetooth technology. There were other improvements like Short Message Service (SMS) smaller batteries and longer battery life, etc. Due to all these improvements, the mobile phone customer base expanded rapidly worldwide.

1.1.3 Third Generation (3G) Mobile Phones

Most present day mobile phones are the third generation phones. The standards used on 3G phones differ from one model of the mobile phone to the other which essentially depends on the network providers. These phones were capable of streaming live videos, stream radio, making video calls, send emails, have mobile TV, have high internet access speed due to HSDPA (High Speed Data Packet Access) and WCDMA (Wideband Code Division Multiple Access) technology. They also use Wi-Fi and touch screen technology apart from performing all the functions of the 2G mobile phones ("History of Cell Phone" 2010).

1.2 Dual SIM Mobile Phones

A *dual-SIM mobile phone* has the capacity to hold two SIM cards. The earliest model of this technology made use of dual-SIM adapters on *single SIM phones* which of course had only one transceiver. The use of this adapter rendered a slim phone bulky. Sometime the SIM card needed to be trimmed to fit into the adapter and the phone. The *dual-SIM adapter* could hold two SIMs at a time and was small enough to fit behind the battery of a regular mobile phone. However both SIMs could not be activated at the same time on the mobile phone. Switching from one SIM to the other was done by restarting the mobile phone; this combination is called a *standby dual-SIM phone*. Recent dual-SIM phones have both SIMs activated simultaneously such that there is no need to restart the phone. these are referred to as *active dual-SIM phones*. Most of these phones have two transceivers in built of which one of the transceivers may support both 2G and 3G while the other transceiver only supports 2G. Another type of dual-SIM mobile phone exists which supports both GSM and CDMA network. A new generation of dual SIM mobile phones makes use of only one transceiver yet provide 2 active SIMs simultaneously e.g. the LG GX200. Some dual-SIM phone use calls management software and can divert calls from one SIM to the other SIM's voicemail when a call is in progress or simply indicate that the line is busy. Both SIM share the phone's memory such that they share the same contact list and SMS and MMS message library (Ii, R. 2010). A recent introduction is mobile phones capable of holding three SIM cards; an example is the Akai Trio ("Dual SIM" 2011).

1.3 Telephony in Nigeria

Up until 2001 Nigeria experienced problems with the services provided by its then main communications service provider the Nigerian Telecommunication Plc (NITEL) including inefficient services, lack of access, limitation of services to places of institution since only landlines were majorly deployed.In 1992, the telecommunications industry in Nigeria was deregulated. First was the commercialization or corporatization of Nigerian Telecommunications Plc (NITEL) while the second was the establishment of the Nigerian Communications Commission (NCC), the telecommunications industry regulator (Alabi 1996). The deregulation led to the introduction of

Global System for Mobile communication (GSM) network providers operating on the 900/1800 MHz Spectrum were MTN Nigeria, Econet (now Airtel), Globacom and Mtel in 2001. As a result the use of mobile phones soared, and has replaced the unreliable services of the Nigerian Telecommunications Limited (NITEL). With an estimated 45.5 million mobile phones in use as at August 2007, and most people having more than one cell phone, Nigeria has witnessed a phenomenal growth in this sector ("Telecommunications in Nigeria," 2011).

2.0 THE NEED FOR DUAL SIM MOBILE PHONE

The GSM service in Nigeria came with its own problems as subscribers were not getting value for their money. Tariffs were high and the GSM service providers were plagued with numerous problems such as instability in power supply, insecurity of infrastructure, call drops, difficulty in network accessibility. Due to the peculiar nature of power supply in Nigeria, GSM service providers had difficulty in powering their cell sites. Electric power generators installed at base stations to supplement or provide power meant additional deployment and operational cost. This in advertently led to increase in call tariffs.

GSM service providers also incurred additional cost with regard to securing installed facilities. GSM Service providers have high numbers of security personnel on their payroll, because these guards are needed to guard their installations against theft and vandals. As of October 2007, Airtel (formerly Zain) had 2500 base stations, MTN-2900, and Globacom-3000 in Nigeria (Adegoke, Babalola, et al 2008). With two security personnel per cell site, one can relate the cost. These costs go into the total cost of operation thereby leading to increases in call tariffs. The presence of security personnel doesn't however guarantee the safety of these facilities since there are reported cases of stolen generators and siphoned fuel from reservoirs (Njoku, 2007).

Major complaints from network subscribers were the inability to access the network to initiate calls. A subscriber had to dial several times before a call could go through. Sometimes after dialing several times, a subscriber might be connected to the wrong number.

Often established calls are abruptly terminated in the middle of conversions. This can happen for several reasons. There may be loss of signal between the network and the mobile phone, when the mobile phone (subscriber) is outside the network coverage area, or the call is dropped upon handoff between cells on the same provider's network. Other causes include cell sites running at full capacity no room for additional traffic, poor network configuration such that a cell is not aware of incoming traffic from a mobile device; the call is lost when the mobile phone cannot find an alternative cell to handoff.

2.1 The GSM Service

Network accessibility, dropped calls and high tariff appear to be must worrisome to the average GSM subscriber. A common maxim then was "of what use is a mobile phone when it cannot be used at will?" Disturbingly, GSM service network problems often persist for days and on rare occasions, for weeks. These problems are peculiar to all the service networks. When one network is down, often service may be available on other networks. The logical option to subscribers was subscription to multiple networks; this of course meant acquisition of multiple GSM phones, with the attendant inconvenience associated with having to keep more than one handset. Many subscribers using multiple handsets experienced loss or theft of some of these phones.

Most Nigerians therefore desired and looked for a means of having two SIMs on a phone to overcome the problem of carrying more than one phone. Major mobile phone manufacturers

however concentrated on producing sophisticated phones with mind blowing features like camera. FM radio, memory card, WAP, GPRS and EGDE capabilities at the time. These companies excelled in *product performance* using current technology to produce better and more durable phones with each new release. They sustained *product performance* with their new innovations and high tech phones.

3.0 THE DISRUPTIVE IMPACT OF DUAL-SIM TECHNOLOGY

Mobile phones of all brands, shapes and sizes, were introduced into the phone market at the onset just as GSM service providers were expanding network coverage. Common household names included Nokia, Samsung, Sagem, Sony Erickson and LG. There were a few other brands albeit insignificant compared to these six. The trend was slick, high-tech mobile phones with improved performance and durability. However, Chinese phone manufacturing companies introduced a disruption in this market trend and became a major player on the *Nigerian mobile phone market* via the introduction of dual-SIM capable phones popularly called "China Phones". Although these products did not equal the existing brands in performance, look and durability, they provided an innovational intervention for the target market in providing access to multiple service networks on a single phone. As such, with the additional vantage of being cheap and easily affordable, the Nigerian market embraced the product. Most of the features on existing sophisticated phones are also available on the *dual-SIM phones*. According to a market research company GFK Retail and Technology, 30 per cent of mobile phones in Nigeria are dual-SIM (Rattue, 2011). This development which is directly related to the phenomenal growth of multi-SIM devices globally is not only in Nigeria. In Indonesia, Vietnam, Ghana and India, the market has grown from one in ten in 2009 to one in four by the quarter of 2010. According to the report, in Middle East and Africa, one in every 10 mobile phones sold uses dual SIM. In Asia, 16 per cent of all mobile phones sold have dual SIM capabilities, which represents an increase from 13 per cent at the beginning of 2010 (Rattue, 2011). There were however warranty issues with the first adapter type *dual-SIM phones*; these adapters could be used with normal *single SIM phones*. The use of the *dual-SIM adapter* voided warranty for such phones. Also "*China Phones*" that are *active dual-SIM phones* are bought from the dealers without warranty. When asked "why?" they reply that they equally bought them wholesale without warranty. Another issue is that of durability; "*China Phones*" broke down unpredictably. In event of fault, local repair shops find it difficult to get replacement parts as there are no service centers or parts shop for such products. The lack of International Mobile Equipment Identity (IMEI) numbers in the unbranded made in China handsets makes them non-traceable and creates security concerns. In spite of these shortcomings the demand for them is ever increasing, as low income earners can easily afford them. Most local mobile phone outlets sell mostly these "*China Phone*". Established firm and global mobile phone manufacturers are facing stiff competition from Chinese brands and "fakes" in the Nigeria mobile phone market. This they have done by enticing consumers with attractive combination of features at affordable prices. Chief among these features is the dual-SIM capabilities of these mobile phones which established manufacturers are slowly introducing (Rattue, 2011). Samsung's D880 Duos was not so successful when it was introduced since calls were only possible with its primary SIM, unlike the Chinese brands which offered dual call capabilities. To initiate call from the secondary SIM of a Samsung D880, it must be made the primary. This difficulty in addition to its high cost were factors that made it unsuccessful. Subsequent Samsung *active dual-SIM phone* models had better performance but their

costs were still high. Nokia only introduced their cheap dual-SIM phone, Nokia C Series in Nigeria in 2010. There is general acceptance in the country that Nokia phones are more durable than others. However, the Nokia C1-00 is a *standby dual-SIM phone* as only one of the SIM is active at a time.

Initially most Nigerians embraced the *dual SIM phones* due to inconvenience associated with carrying two mobile phones at the time. Presently, there is improvement in the power sector in the country. There have also been reductions in inaccessibility to GSM networks and the rate of dropped calls. And insecurity still remains an issue at each cell sites. The inclination to ownership of multiple mobile phones is currently not only driven by these factors but by new factors including lower call tariff, promo by various GSM service providers to entice customer and privacy/ personal security issues.

3.1 The Way Forward

Some of the problems facing the dual-SIM "China Phones" and possible steps to address them.

- No warranty Issues
- Poor durability
- No service centres
- Difficulty in Getting Replacement Parts
- Security Issues (No IMEI number)

The cases of void warranties as a result of using *dual-SIM adapter* on normal single SIM mobile has drastically reduced if not eliminated by recent *active dual-SIM mobile phones*. The lack of warranty for a product often creates doubt in the mind of the customers as to durability or authenticity of the product. Wholesale dealers who get these "*China Phones*" should be made to demand that the manufacturers of such phones issue warranties for them. This will encourage more patronage.

The issue of durability can be a result of poor design or the use of substandard materials to implement the *dual-SIM technology*. Since most of these phones are cheap as compared with other *dual-SIM mobile phones* manufactured by big and popular mobile phone manufacturers like Nokia. Samsung etc. There is the likelihood that the use of substandard materials is the cause of poor durability. Better materials will lead to increase in cost of production and product cost. I believe they can strike a balance and still produce phones that are reasonably priced. Initially, the "*China Phones*" had short battery life, but the phones now come with extra battery.

Chinese phone manufacturing companies need to establish service centres in the country or train and certify a hand full of owners of local mobile phone repair shop who will in turn pass on the skills acquired to others such that there will be enough skilled technicians who will be able to repair these phones in the event of faults. Replacement parts for "*China Phones*" should be made available to the trained technicians through the service centres.

There is need for regulation to stop the use of *dual-SIM mobile phones* without IMEI number. International Mobile Equipment Identity (IMEI) number is unique to every GSM and WCDMA mobile phone and found printed inside the battery compartment of the phone. It can be displayed on the screen of the phone by entering*#06# on the keypad.

In India when a large percentage of people used such phones, mobile operators implanted IMEIs onto such phones rather than bar services. But the Indian government placed a ban on the usage of phones without IMEI which took effect from December 1, 2009.

4.0 CONCLUSION

The need for communication in spite of poor network coverage and quality of service by the Mobile (GSM) service providers, informed ownership of

multiple number of *single SIM mobile phones* to guarantee access to available network services by mobile phone users in Nigeria, with associated multi-phone ownership problems. Major mobile phone manufacturers who prefer a *sustained technology* model responded to the increase of market with improved and more sophisticated products. Disruptive market innovation by way of *dual-SIM mobile phones* products met market anticipation. These dual-SIM " made in China" phones were not as attractive or as durable as the existing sophisticated brands but had most features on these phones and were cheap and affordable. The dual-SIM phones performance were also affected by short battery life, plus absence of warranties, technical support/services outlets and replacement parts. Additional security issues are associated with the phones' lack of IMEI numbers. However, the *dual-SIM innovation* met a market need and is widely used in Nigeria. Whereas electricity supply, insecurity and other problems which informed telecoms service quality which informed multiple phone ownership are declining, personal security issues and preference of lower tariff offerings continue to inform multiple network access. As such, dual SIM phones remain a popular market choice. Associated problems with this dual SIM products must however be addressed by the China based manufacturers and other market players.

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KEY TERMS AND DEFINITIONS

Active Dual-SIM Phone: A dual-SIM that has both SIM activated. calls can be made or received simultaneously and there is no need to restart or switch between SIMs.

Cell Phone: America's name for mobile phone

China Phone: Substandard and sometimes unbranded dual-SIM mobile phone manufactured in China

Dual-SIM Phone: Mobile phone capable of holding two SIM cards that may or may not have both SIM cards activated to make or receive calls simultaneously.

Standby Dual-SIM Phone: A dual-SIM mobile that has one SIM activated at a time and needs to be restarted to activate the other SIM or switch between SIMs.