Odoh Chukwuka

Disruptive Innovation in Telecommunication Industry

A case study of soft-SIM

Master's Thesis

Spring 2017

School of Business and Culture

Master's Degree in International Business Management

SEINÄJOKI UNIVERSITY OF APPLIED SCIENCE

Thesis Abstract

Faculty: Business Administration

Degree Programme: Master´s in International Business Management

Specialisation: International Business management

Author: Odoh Chukwuka Ignatius

Title of Thesis: Disruptive Innovation in the Telecommunication Industry

 A case study of soft-SIM

Supervisor: Dr. Sivula Ari

Year: 2017   Number of pages: 59   Number of Appendices 0

This study is on a conceivable disruptive innovation in the telecommunication industry, with specific interest in the adoption of soft-SIM among telecommunication firms. The objective was to the ascertain possibility of acceptance of soft-SIM among mobile operators. Over the years, there have been series of SIM card transformations. In order words, SIM has reduced significantly in size than the standard size. Soft-SIM is anticipated to be the next generation of SIM. Therefore, the likelihood of soft-SIM acceptance is the focus.

The research was made using case study design. Data was obtained via related literature and interviews. Interviewees were gotten from Nigeria and Finland and in-depth information was granted by the informants. Basically, the data was primary data which are the interviews and secondary data from literature which include printed books from academic library and non-printed materials such e-journals and blog.

The findings shows that though soft-SIM appears to be a landmark innovation in the telecommunication sector, however, mobile operators repudiate the idea of soft-SIM due to some expected threats such as: Fear of losing customer´s loyalty and Churn, a situation of frequent migration from operator to another.

Keywords: Innovation, Disruptive innovation, Telecommunication, Soft-SIM.

TABLE OF CONTENTS

Terms and Abbreviations

O/I	Input/output
SSC	SIM standard component
SAC	SIM active component
UD	Universal Discovery
SE	Secure Element
SIM	Subscriber Identity Module
IOT	Internet of Things
MNO	Mobile Network Operator
UICC	Universal Integrated Circuit Card
TLS	Transport Layer Security
GSMA	Global System Mobile Association
M2M	Machine to Machine

Tables, Figures and Pictures

1 INTRODUCTION

From the time of introduction of SIM card in the early 90s, SIM card had transformed significantly into different generations and sizes (Battu 2016, 255). Originally, it was of the size of a credit card, then in 1996, Mini SIM card was introduced and was significantly smaller than the standard SIM card. In 2003, there was Micro SIM, another generation of SIM card which became relatively smaller than the Mini SIM card. Subsequently, in 2012 Nano SIM card emerged, this time, apparently smaller than the preceding generations of SIM. Nano SIM card is designed for early 2016 smartphone such as Honor 7 lite. Also in existence is the embedded SIM created by the GSM Association (Battu op.cit.256), with the idea to promote machine to machine communication.

The choice of this studies is inspired by the quest for understanding the evolution of SIM card since 90s till date and examination of the future possibilities and outlook of SIM. The studies intend to find out how the mobile operators can adopt the soft-SIM as a replacement for the SIM card. Also in examination is the probability of adoption of soft-SIM by the mobile operators.

In recent time, the mobile operators have been contemplative on the adoption of soft-SIM in the telecommunication industry (Ahokanga`s interview, 2017), as a positive destruction of the physical SIM card .In 2014, Apple made an attempt towards developing SIM nearer to soft-SIM in UK (Meukel et al, 2016). This SIM enabled subscribers to choose their preferred mobile operator service directly from their smart gadget. However on the contrary, Banks (2014) opposes that Apple SIM is far from soft-SIM as there is presence of a physical SIM.

1.1 Aim of the study

The study attempts to examine the possible use of soft-SIM among the mobile operators. The major objectives of this research are to find out the probability and possibility of disruption of the current generation of SIM, This appears to be significant considering the past evolution of SIM and the future outlook of disruption of SIM.

1.1.1 Research Problem

SIM has been developed severally over the years. The concern and interest of this research is to ascertain the chances of emergence of a new generation of SIM, in form of software. There have been significant changes in the evolution of SIM over the years. At first, in year 1991, the SIM was of the size of a credit card, then in 1996, it metamorphosed to mini size, later it was in form of micro size, as from 2012 it became in form of Nano SIM size up till date. The studies wants to inquire possibility to adopt soft-SIM by the telecommunication industries

1.2 Scope of the study

The study covered a narrow inquiry of the chances of use of soft-SIM among the mobile operators. At the end, the reader would have a clue as to the fate of soft-SIM in the telecommunication. Main sources of data is both primary and secondary data. The research included some related literature on innovation, articles on SIM development, few interviews drew from experts in telecommunication and top employees in telecommunication firms in Finland and Nigeria respectively. This research cannot be said to have covered everything about disruptive innovation and soft-SIM, rather the researcher feels that it will assist as a stepping stone for further theory development on disruptive innovation, with particular reference on soft-SIM in the telecommunication industry.

1.2.1 Research Methodology

The methodological style deployed to elucidate the research problems were discussed and given justification. Qualitative research method is used in the research. Classic single case study design (Yin, 2009.170) is adopted to buttress the points, the discussion was case study design, using interview data gathering method.

1.2.2 Structure of the thesis

Chapter one summarizes the general background of the thesis, pointing out the aim of the study, the research problem, brief analysis of the thesis scope and the research methodology.

Chapter two compared different views about innovation, related literature on disruptive innovation and innovation in general. The emphasis is on soft-SIM chances, benefits and demerits. Different types of innovation was discussed as well as how soft-SIM works. Chapter three narrates the research design employed, as well the structure of the thesis, starting from the tittle page to discussion. Chapter four narrates the research method employed. Qualitative research was discussed and compared with quantitative research. Sampling method is also discussed and analyzed. The data gathering method (Interview) is discussed and the primary data outcome determined too. Chapter five discusses the findings, analytical generalization is used to draw conclusion.

2 THEORETICAL BACKGROUND

According to Latzer (2009, 599), different scholars depending on their fields, have described the concept of innovation from several perspective. Trott (2005, 7) identifies innovation to be the engine of growth in every business endeavor. Precisely, Latzer (op.cit.608), views disruptive technological improvement as an innovative destruction that modify and overhauls the entire structure of a technology.

Correspondingly, Hang et al (2011, 4) points out that the concept of innovation is a continuous process and is essential in the sustainability of business. Trott (op.cit.5) emphasizes that businesses must be able to adapt and evolve if they wish to survive. Also, Linkner (2009, 166-167) suggests that Businesses must acknowledge that the customer´s taste and segment are always changing, even if the business is foremost in their field, it must strive to innovate. This implies that innovativeness is important at every stage of business life cycle. Also, concept of innovation in business has existed over the years, since the nineteen- Century. Table 1.0 below describes the economic development driven by technological innovations as at early nineteenth –century.

Table 1. 19th century economic development powered by Technological innovation (Trott 2005).

Innovation	Innovators	Date
Steam engine	James Watt	1770-80
Ron boat	Isambard Kingdom Brunel	1820-45
Locomotive	George Stephenson	1829
Electromagnetic induction dynamo	Michael Faraday	1830-40
Electric light bulb	Thomas Edison and Joseph Swan	1879-90

Jia et al in the work´´ Discrete Dynamics in Nature & Society`` (2016), perceive Innovation as an effective way to get profits adding that concepts should have appropriate model of innovation in order to drive an innovation. However, Nambisan et al, in the article ´´Digital Innovation`` published in MIS Quarterly vol.41 No.1.2017, view innovation as the use of digital technology during the process of innovating. In addition, Rogers (2006,11) had earlier given an encompassing description of innovation, describing an innovation as knowledge, practice, or object that is perceived as new by an individual or other unit of adoption in a social system.

Innovation naturally passes down from the originating source to the different strata of the social system. The rate at which innovation disseminates in the social system differ from one innovation to another, this is because there are

key factors that determine the facilitation of the dissemination of the innovation. In addition, the rate of accepting or rejecting an innovation is dependent on the diffusion effect. Diffusion effect means the increasing degree of influence upon an individual or groups of individuals to accept or repudiate an innovation. Usually, it is due to the interaction of peer networks about an innovation in a social system.

Rogers (1983, 234-235) argued that a situation that only 5 percent of the individuals in a social system are aware of a new idea, the degree of influence upon an individual to adopt or reject the innovation is quite different from when 95 percent have adopted. According to Rogers (1983.10), the main elements in the transmission of new ideas include the perceived innovation, the channels of communicating the idea to the strata of the social system, the duration it takes and the members of social system.

This process of disseminating information among the strata of the social system is known as diffusion. It is imperative to note that diffusion occurs within a social system, because the social structure of the system affects the innovation's diffusion in several ways. The social system constitutes of adopter categories, a boundary within which an innovation diffuses. Moore (2005, 14), proposes that the bases of technology adoption life cycle is anchored on diverse responses which organizations and people make in a situation of disruptive innovation, within their social system.

2.1 Adopter categories

As aforementioned, there are echelons of adopters that form the social system; they form groups according to how first they get the information and their degree of responsiveness. There are peculiar features of each group that make them to act in a certain different patterns. Rogers (1983, 248-250) postulates the five-adopter categories and characteristics:

Innovators: They tend to be Adventurous; however, they constitute relatively small smaller part of the social system. Innovators play a very important role in the social system. They always seek for anything new, and are very fast to adopt new trends. Innovators are aware of innovation earlier the formal disclosure to the rest of the social system. They are often ready to have the innovation at high cost and pay costly to be among the first to have the offering.

Early adopter: Members of this echelon are opinion leaders. They are intense to find out a new trend (innovation) and their usage. They then pass the information to the rest below the social system. They are sine-qua-non to influencing the attitude and changing the behavior of the later adopters. The rest of the later social system depend on their influence and opinion to take decision.

Early majority: The early majority carefully observe the early adopters, but wait to adopt innovative products or idea when they are convinced that they will get value from their money. The people that belong to this group do not adopt innovation on impulse. They adopt innovation based on prove of the result and testimony from the early adopters, they usually adopt innovation if they are sure the new product will provide usefulness to them.

Late majority: This are also called skeptics, the late majority wait until a majority of consumers has accepted an innovation and the price has dropped before adopting the new product. The late majority typically adopt innovative products because they feel that everyone else is doing it. They get influence from bandwagon effect and risk little or nothing by adopting innovation.

Laggards: They are called traditionalists, laggards are the very last group to adopt a new product. They usually do not adopt on instinct buying rather they adopt when there is serious need for it. Laggards are contented with what they have, and they adopt new products indifferently and only because it is a necessity.
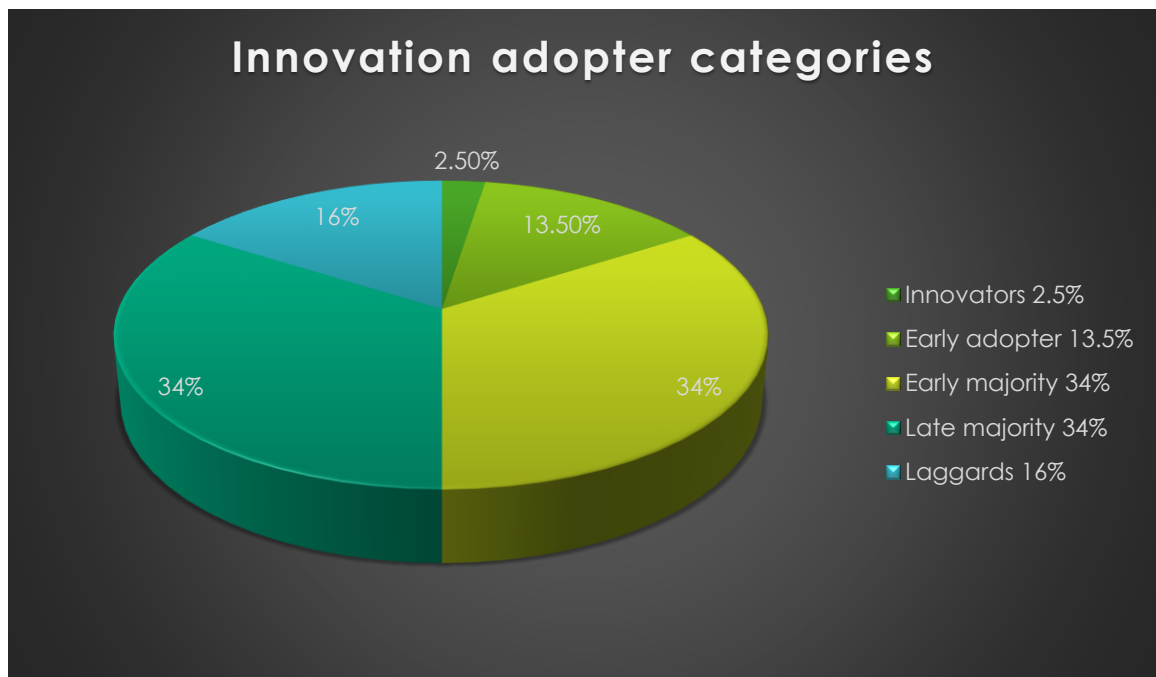
Figure 1. Adopter categorization (Rogers 2006)

2.1.1 Innovation Diffusion Process

 Researchers in the area of innovation diffusion claim that individual adopter display some overt and covert behavior before accepting or repudiating innovation. This implies that for an adoption to take place there is process that occurs over time and consists of a series of actions. Figure.2 shows the exact nature of these sequential stages in the process of innovation decision.

This action include:

1. Knowledge or awareness of the innovation's existence and gets some understanding of how it functions.

2. Persuasion that happens when an individual or group of individual develop favorable or unfavorable attitude toward the innovation.

3. Decision which happens when an individual (or other decision-making unit) engages in activities that lead to a choice to adopt or reject the innovation.

4. Implementation which happens when an individual (or other decision-making unit) puts an innovation into use.

5. Confirmation: happens when an individual (or other decision-making unit) seeks reinforcement of an innovation-decision already made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation.

| Knowledge of innovation | Persuation about innovation | Decision to adopt | Implementation | Confirmation |

Figure.2 Innovation diffusion process (Rogers 2006)

On the contrary, Gartner (2008, 10-11) had earlier criticized swift adoption of innovation, as there are speculations that most innovation come with hype to lure investors and other stakeholders. Gartner's (op.cit.14) Hype Cycles proposes a model on relative maturity of innovation in a certain domain. Gartner did not only provide a scorecard to separate exaggeration from reality, but gave models that help potential adopters decide when they should adopt new technology. Innovations face criticisms because it promise over-emphasized claims and meet relatively a few of the claims at the onset, then disillusion sets in and thereafter there will be a balance. Innovation diffusion scholars postulate that the balance stage is the right time to adopt an innovation because the adopter will take informed decision not based on hype. Figure.3

shows Gartner´s model.
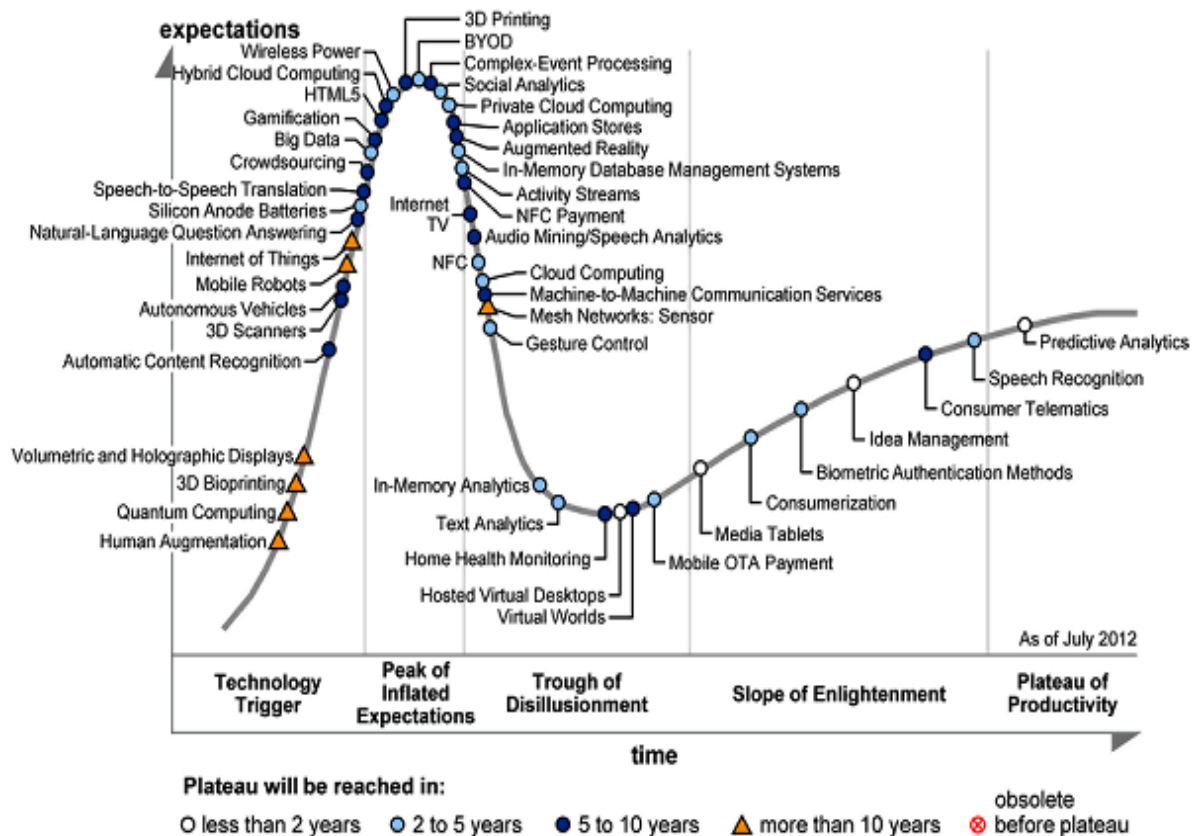
Figure.3 Gartner´s cycle model on innovation adoption (Gartner 2014).

2.2 Types of innovation

There are different types of innovation as postulated by Moore (op.cit.61-72).
According to Moore, these innovation types are first in a cluster of four zones,
and then sub-divided into precise innovation types.
The demonstration of the four main innovation zones are in Figure.4

Figure.4 Four innovation Zones (Moore 2005).

The four zones of innovation are subdivided into specific innovation type

    (a) Product Leadership area:

        Disruptive Innovation: These comprises Products and services which make change in technology termination. It disrupts the mainstream technology and create room for new one. This changes the initial standards and value chains are swapped in favour of new approaches. Soft-SIM is an example.

        Application Innovation: This is also referred to ´´solution innovation`` by Moore (op.cit.64). This entails finding new benefits, unexploited potential markets, and linking existing functionality for an existing innovation.

        Product Innovation: This requires refining on the functions and benefits of existing products. These are attained by improving the functionality and usability for existing markets.

Platform Innovation: pioneers of Platform innovation form initial innovation foundation on which third parties can build further value. Success here relies on architectural control, relationship building, and generating benefits for the entire ecosystem. Famous examples are Intel and Microsoft.

(b). Customer Intimacy

Line Extension Innovation: In Line-extensions innovation, new and innovative branches emerge in current groups. There are some kind of fundamental adjustment to achieve this objective, for instance, modifications of packaging to make new products and services.

Enhancement Innovation: In this type of innovation, specific reforms on the structures of product are made.

Marketing Innovation: Marketing innovation uses new or effective tools of marketing to outpace competitors.

Experiential Innovation: This classification of innovation happens most often in service area, or by augmenting the service to an existing offering.

(c). Operational Excellence

Value Engineering Innovation: The intention here is to manage costs judiciously in business for existing offering without compromising their contents. Enhancing parts and the overall assemblage upgrade are the goal here.

Integration Innovation: This is the opposite of value-engineering innovation, the price of customer's title decreases due to simplification.

Process Innovation: This is a type of innovation on the process of making product or rendering service rather than offer itself.

Value Migration Innovation: This type of innovation moves interest from commoditized offerings to segments that are richer in profit and growth opportunities.

(d). Category Renewal

Organic Innovation: This entails refocusing a business`s to a developmental group.

Acquisition Innovation: This approach is related to merger and acquisitions by interested parties.

Harvest and Exit: This thoughtful decision to bring to an end the life cycle of a business.

2.2.1 SIM EVOLUTION OVER THE YEARS

Previous reports on the metamorphosis of generations of Subscriber Identity Module ´´SIM`` is an indication that SIM had undergone some significant reforms over the years. Many of these SIM undergo reformation with each technological replication or disruption yet, perform a multitude of functions with sufficient processing capacity. They will also need to have built-in cellular connection. The soft-SIM technology is one of these possibilities, in the form of reprogrammable SIM downloaded in the smart device.

Subscriber Identity Module (SIM), the basis for this academic inquiry had advanced through so many stages, firstly, it was of the size of a credit card, then it was Mini SIM card, and this SIM card was common among older phones and first generations of smart machines. Mini SIM size is comparatively bigger than what we have now (ubergizmo 2017). The succeeding generation of SIM card is a relatively smaller in size, it is known as Micro SIM. This was as at then, the standard size for smart appliances. Then the latest and the smallest SIM Size so far is the Nano SIM. Also existing is the Embedded SIM. Picture. 1 shows how the size of the SIM has reduced to the 4FF SIM (or "Nano SIM") that is widely used in new smartphones today (GSMA Intelligence 2015).
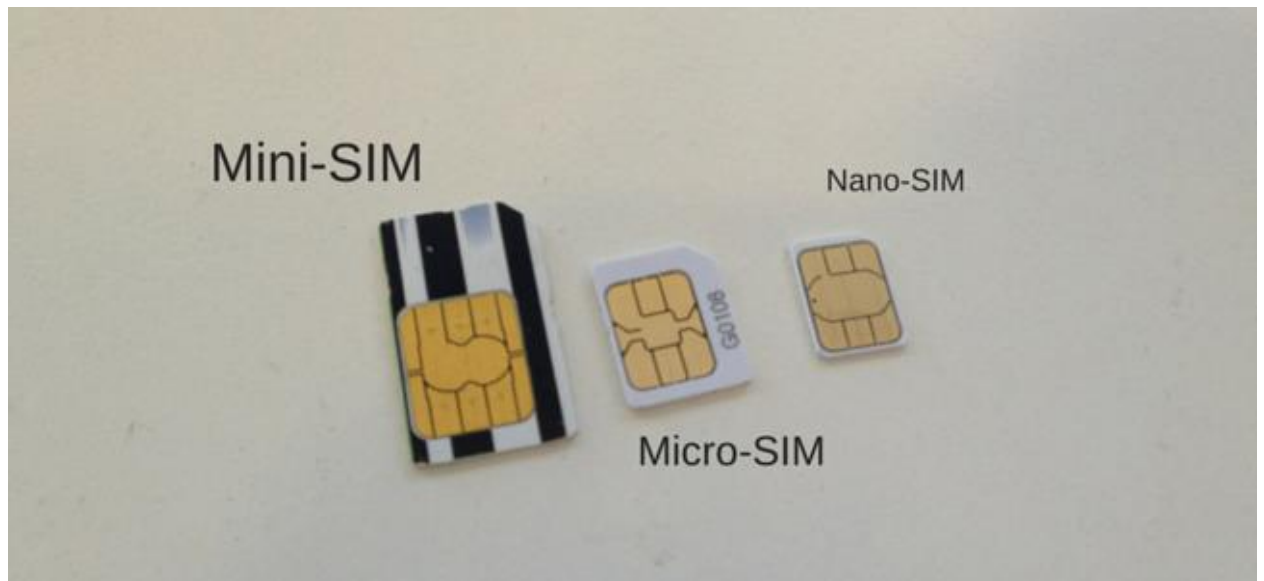
Picture. 1 Different sizes of SIM cards (ubergizmo 2017).

Nano-SIM, which are relatively smaller than their predecessors, was introduced in early 2012. Nano SIM is used as from middle 2016 smartphones such as Honor 7 lite. Despite their small size, these cards can store as much data as larger cards.

Table 2. SIM sizes (Ken`s Tech).

Variation	1FF	2FF ("Mini SIM")	3FF ("Micro SIM")	4FF ("Nano SIM")
Year	1991	1996	2003	2012
Size (mm)	85.6x 53.98	25.0 x 15.0	15.0 x 12.0	12.3 x 8.8

2.2.2 SIM DEPLOYMENTS

In this section, we will first explain the term "Traditional SIM card approach" "Embedded SIM" and "Remote provisioning". Following these definitions, we will look at the different device´s segments and the SIM solutions currently deployed in each.

Traditional SIM card method

The traditional SIM card is piece of removable hardware that connects the subscriber's appliances to a network. This SIM card stocks the operator´s data. This comprises operator profile, information that permits identification and authentication of the SIM card with respect to a selected mobile networks.

Technically, the traditional SIM is built on the UICC technology of a card. The UICC is a protective computing appliances that is used through many sectors including mobile telecommunications. The UICC corresponds with the stipulations of ETSI Smart Card Platform.

Embedded SIM

According to GSMA Intelligence publication (2015), embedded SIM is designed to enhance machine to machine (M2M) communication. In this kind of situation, the SIM is attached physically to the device. Practically due to the integration of the SIM to the device; it cannot be removed from the device and replaced with another SIM. This kind of situation can also occur when there is a contract or subsidy within the SIM and the device producer.

Remote Provisioning

Remote Provisioning is the ability to effect some changes on the SIM profile on a deployed SIM without necessarily changing the SIM itself. This technology can be implemented on any SIM form factor, including removable and soldered SIM. In order to achieve this, the SIM has additional memory and is therefore is able of holding extra operator`s profile rather than only one on the traditional SIM. GSMA intelligence report (op.cit), states that the update of remote provisioning SIM approach can be via the air

History of SIM card

SIM card history is traceable to the beginning of use of the GSM mobile network communication (thewirelessbanana, 2013). SIM card was first developed in the year 1991. The cards were created on joined circuits called subscriber identity modules. These modules store information required for authentication to enable the subscriber's phone to link to a mobile operator´s network. Serial number as well as network information identify each card, and users can remove or replace the card from one phone and install it in a new one without registering the device.

According to wirelessbanana`s publication (2013), the first SIM cards were of the size of a credit card, but condensed over time to less than postage stamp size. SIM cards had advanced and developed increasingly better features and storage capacities. Mediocre cards are able to store information such as contacts, locations of subscriber, text messages, patches, and settings. They also accommodate applications and permits users to access them from any phone. The SIM card supports GSM facility in various countries. The SIM is a relatively small, inexpensive memory chip with a security algorithm that provides a protection mechanism against malicious manipulation. According to developer. Samsung, in tech-insight article titled ´´history-of-SIM¨, the SIM ensures identification and authentication competently with the aid of EAL-5 (Evaluation Assurance Level).

The SIM however, is not without a standard yardstick. The standardization falls mainly under the helm of affairs of two international agencies; the International Organization for Standardization (ISO) and International Electro-technical Commission (IEC). The duo create the standards for smart cards together, and serve as the base for most smart card standards., Correspondingly, European Telecommunication Standards Institute (ETSI), has also created smart card standards in the Technical Committee for Smart Card Platform (TC SCP) (Wolfgang &Wolfgang 2010).

In 1991, Giesecke and Devrient supplied the first saleable SIM card to a Finish Network operator. The SIM card was at first designed to work on the standard GSM network as at then and was of the size of credit card (GSMA Intelligence 2015). According to (Giesecke & Devrient), the key role of the SIM card was to achieve two things; Identification and Authentication, both of these benefits are still relevant till today:

1. **Identity:** The SIM card contains a unique location number that identifies the SIM card as well as the accompanying subscription. The operator`s network can recognize the location number and ensure that associated cost incurred go to the users correctly.

2. **Authentication:** In order to ensure validity of the identity, the mobile operators use a security apparatus to give access to the network. These authentication processes gets verification by ordering some safety information from the SIM by the network operators, and once this information is guaranteed, access to the network is established. Additionally, if the SIM card damages or the security is compromised, new SIM card is replaced. Therefore, the secured connectivity is restored without substituting the entire handset.

   Similarly, if a consumer wishes to migrate to different network provider, they can do so through swapping the relatively low-cost SIM card rather than the entire handset. That is, if there is no agreement between appliances and mobile operators. Otherwise, the subscriber can port to alternative mobile operator whereas using the old mobile operator platform.
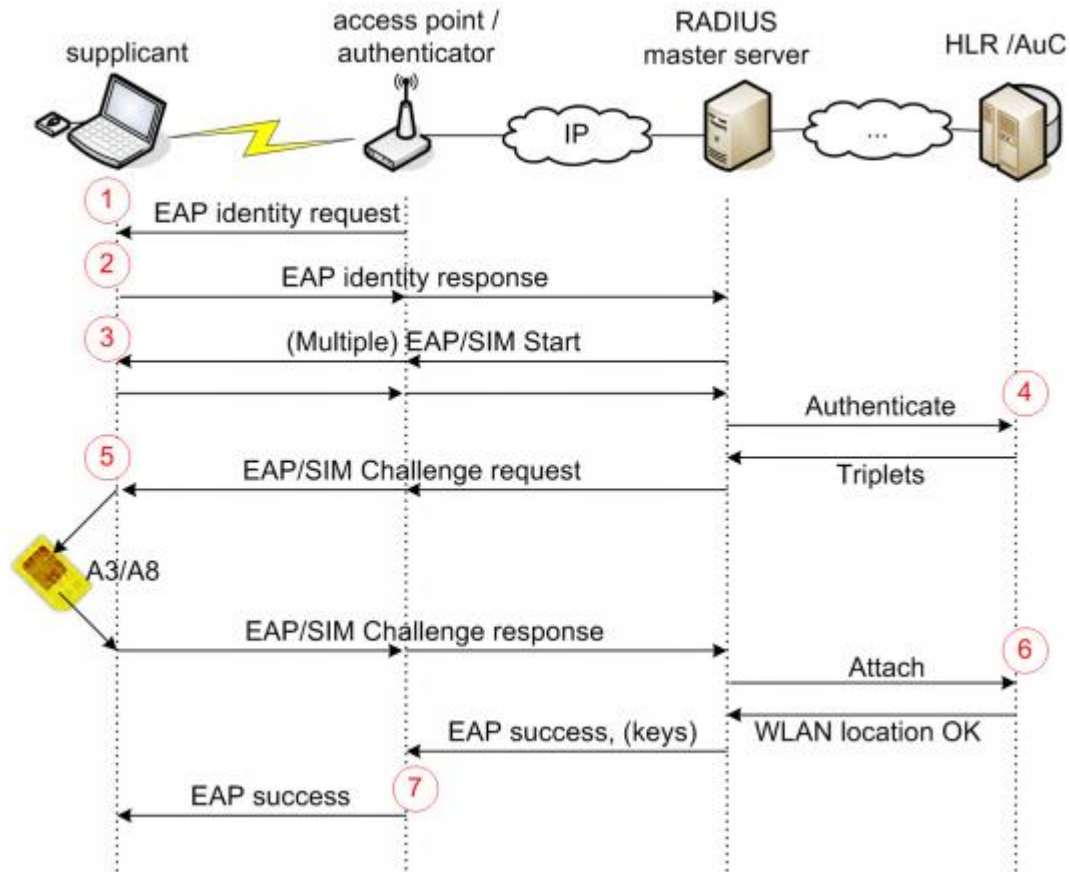
Figure.5. SIM authentication architecture (Penz 2004).

The SIM card also brings secondary benefits for the end users:

 Authorization: Authentication differs from authorization, authentication is Sine qua non of authorization, the authenticity of a user must be confirmed before he or she is authorized to link to the network, especially for clients in an untrusted location. It allows verification of the identity of the parties devoid of displaying public secrets (Wolfgang&Wolfgang op.cit.26). Authorization is the process of deciding if a certain subscriber is eligible to have access to a particular service or not, to access a resource or make use of service. When services are requested for essential approval, it is protected from intruder. Authorization tokens are secured when making service request and are not easily faked, and are prevented from response attack.

Portability: This refers to the relocation of stored identity on the SIM card, The SIM identity can easily be moved to a new device when the consumer upgrades or replaces their handset.

2.3 Soft-SIM: a disruption of SIM card

Disruption in technology is attributed to technological improvement (National Research Council 2010, 11). Similarly, Latzer (2009, 604) likened disruptive innovations with radical innovations. According to National Research Council (op.cit.11), disruption occurs to either modify the existing configuration of technology or to end the previous technology. This implies that disruptive in-novation involves the discontinuation of existing mainstream trend for another new trend. Nevertheless, Clayton et al (2004, 132) suggest that creating a niche is part of disruptive innovation. Clayton et al (op.cit.132-133) pointed out the case of CRJ-200 (Canadian regional jet) versus the then dominant airlines Boeing and Airbus as an illustration for innovation in niche.
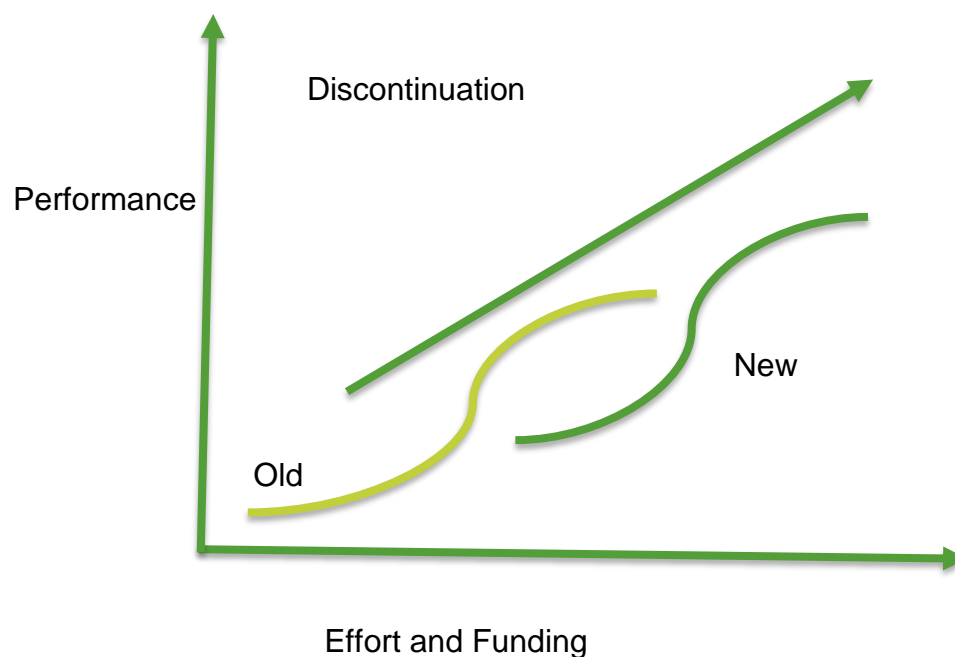

Figure 6. Disruptive innovation curve (Gans 2016).

Nowadays, smart devices adoption and connection are advancing rapidly, this will eventually shape the future and the ecosystem of Telecommunication In-

dustry. Proactive measures should be followed by Innovative Telecommunication firms in order to remain relevant. According to EY ´´Risk in Telecommunication`` (2014, 11) Telecommunication industry must ensure to maximize the opportunities of new dimension in evolving industry ecosystems and they must adapt to new roles across a growing number of industry value chains.

Soft-SIM, equally referred to as software SIM is a complete soft app and data that has all the features and functionality of a SIM card but does not have enclosure in a secure data storage. Rather it is stored in the memory and processor of the mobile device. It usually does not have SIM hardware layer. The soft-SIM is anticipated to be out to the next generation of smartphone (whatphone). Samsung and Apple have been playing with idea of soft-SIM. Attempt was made by Samsung to experiment this innovation in the Samsung Gear S2 wristwatch and is anticipated that this trend would be let out in generation of smart appliances. Soft-SIM is to be downloaded and installed via the app stores like apple store etc. Below is an example of a platform to download sof-SIM.
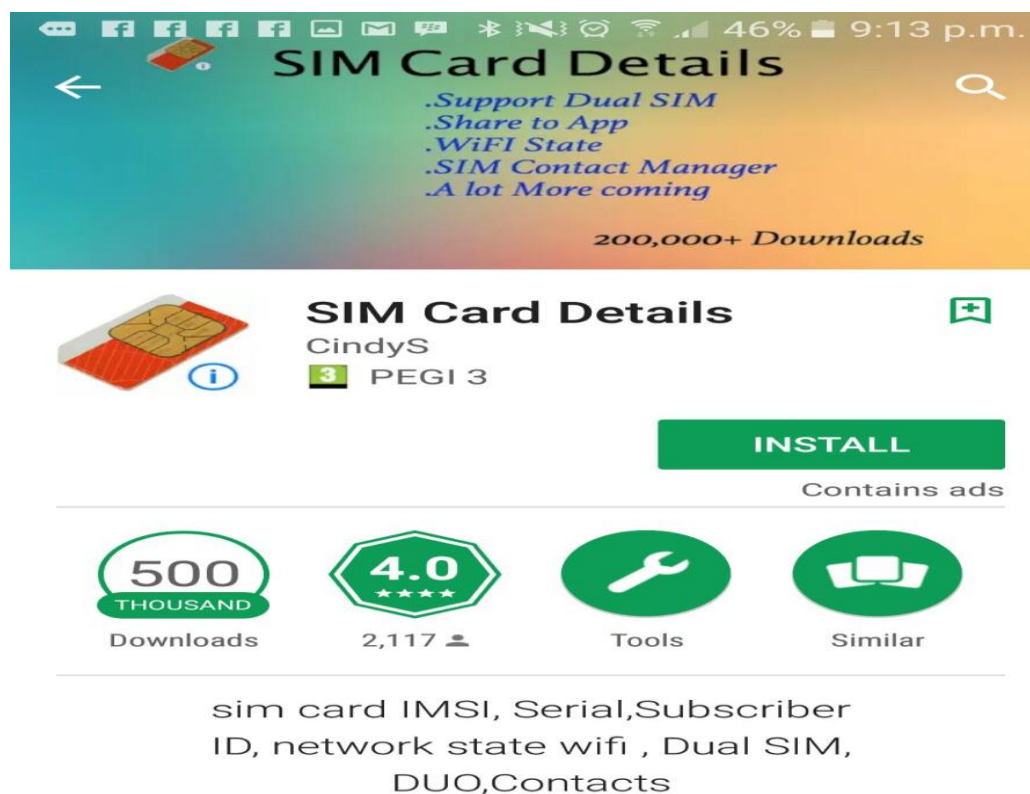

Figure. 7   Play store for SIM download (web page 2016).

According to the article titled ''the future of Australian mobile phone SIM cards''
by Whatphone Australia, the soft-SIM will substitute the existing physical SIM
card. That means that soft-SIM shall disrupt the existing SIM card, and that soft-
SIM can aid smart devices to connect to mobile operator´s network for mobile
data and mobile reception connectivity. Whaphone postulates the speculation
of this technology many years but it has taken until now to become a fully func-
tional part of currently manufactured devices. Also, Apple announced this func-
tionality for the first time, it is to be in their newest iPad. Similarly, Samsung
presented this in their Samsung Gear S2 watch, this trend is yet to be widely
accepted as a standard on all smartphones. With Apple introducing the soft-
SIM, there is tendency that they are observing the market and consumers at
the same time, to ascertain response to this new feature, as well as keeping an
eye on the carriers which are supported by the SIM.

According to Elaheh (op.cit.56), the idea of proposing the soft-SIM is to
change the current SIM by a strong component connected on the mobile
phone. This equally called Secure Element and software SIM downloadable
via play store. Also Elaheh (op.cit.56), further asserts that there are different
interpretations of the concept of software SIM). The ideology of soft-SIM tech-
nology has not gained mainstream acceptance due to general worry regarding
the security of the Software. Also, poor Mobile Network Operator support of
Soft-SIM. Elaheh (op.cit.56-57) claims that for the soft-SIM environment, the
hardware platform is accountable for safety of the SIM activities. Elaheh main-
tained that to authorize means an imposition of instructions via software and
components of hardware in a completely safe situation. The implication is that
protection is realized from synergy of hardware components and their imple-
mentation.

2.3.1   How soft-SIM works?

The soft-SIM is a technological functionality, which has was test-marketed in
the most recent iPad tablet, Samsung Gear S2 watch and anticipated to be in
upcoming smart mobile appliances. A soft-SIM is a built in feature that will re-
place the traditional physical SIM card and will authorize users to connect to

mobile operator of choice, by selecting the carrier that they wish to use and entering in their details.

No longer will subscribers need to replace the current physical SIM card in their appliances nor port to their next service provider. Swapping service providers will be automatic and immediate, all done from within the device with only a few taps of your finger. For instance, a subscriber can switch from Saunalahti to Sonera or even to MTN in Nigeria within seconds by simply signing out the not needed SIM and signing in the preferred SIM.

This will allow consumers to have an even more level of flexibility and options when it comes to selecting which SIM. However, it is most suitable for prepaid plan. Soft-SIM share some similarities with Apple's MVNO and SIM card, since it also presents users with all available operator profiles. However, unlike Apple's technology, soft-SIM enables dynamic via air provisioning once a network is selected. Today, the sector may react much more favorably. In addition, machine-to-machine (M2M) applications have used this architecture for in-built SIM cards for several years now with great success.

The previous SIM disruption portends the possibility of soft-SIM, for instance, because of the progress in the number of M2M and the growth of consumer e-SIM specifications by the GSMA, the distribution of e-SIMs was quoted to outgrow that of traditional SIM cards over the next several years by a large margin. Meukel (ét.al.2016). This means that disruption will continue to happen in the life cycle of SIM.

2.3.2 Soft-SIM Access and Connectivity

In time to come, soft-SIM yardstick will likely entail a new or non-provisioned appliances to link to an online service (for example, a soft-SIM profile discovery server) to download an operator profile to the smart device. Certainly, details about the soft-SIM operating model including the needed components for a provisioning architecture will get approval from OEMs, network operators, SIM vendors, and the GSMA.

Although architecture components remain the same as the existing environment, however, the industry group needs to agree on a solution for how the online discovery service will create the initial linking between the handset and the profile-generating units. Independent ownership is preferred from a consumer perspective to ensure that all available mobile operator profiles are available for selection without the need to state a preference for a specific provider. The modification of SIM connectivity will absolutely alter the existing SIM ecosystem, for instance, enabling through the air provisioning of operator profiles requires a standardized architecture with agreed-upon interfaces and procedures across all ecosystem participants.

The use of soft-SIM platform implies that the competent app developers will negotiate with hardware smart appliances manufacturers directly, and the industry value chain may face reconfiguration. The manufacturing and distribution of physical SIM cards becomes obsolete, although reconfiguration and profile management service area already form a significant part of the value created for old-style SIM card vendors. Physical SIM cards are not expected to disappear from the market within the next few years. Rather, a relatively long phase of side-by-side existence between SIM technology and the new standard is expected.

Profile generation unit: soft-SIM profile generation will take place via the same processes used for SIM profile development. SIM vendors will use authentication details provided by network operators to generate unique network link keys. Rather than storing these details on physical SIM chips, they will be in digital form only and will await a request for download triggered by the embedded universal integrated circuit card (e-UICC) in the consumer's handset.

Profile delivery unit: The profile delivery unit establishes the connection between the e-UICC in the appliances and the profile generation service. This is responsible for encrypting the produced profile before it gets transmission into the device. While theoretically, all participants in the new soft-SIM ecosystem could operate the profile delivery service, those most likely to do so will be either

the SIM vendors or the mobile network operators (MNOs) physical and virtual—themselves.

2.4 Merits of soft-SIM

The SIM card in its current physical form leaves all of the control of consumer's choice in the hands of the mobile operators and allows them to dictate the fate of consumers subscribing to their service. Nevertheless, with the soft-SIM, there is high flexibility in switching from among different mobile operators. Earlier report (whatphone), claims that with soft-SIM in recent years in Australia, consumers have been lucky to receive varieties, this was facilitated by MVNOs entering into the telecommunication industry, allowing them to switch providers if they find a better deal.

Again, with soft-SIM, telecommunication industry ensures to put cost under control. Additionally, to support and benefit from the emerging new technology markets, relevant organizations such as GSMA and 3GPP recognize and had started several initiatives to address the issue. In the new business models and usage situations (e.g., downloadable SIM application), the user easily can have access to several networks but by installing soft-SIM, the user is connected to the specific network and to change network he or she has to insert another card in device. On the other hand, soft-SIM is of great benefit to the subscriber as it allows flexibility for the consumers. It gives device owners the ability to compare networks and select service at will directly from the device. (Meukel et.al.2016).

Since there is accompanying cost for issuing hard SIM, the mobile operators would save money by providing Soft-SIM. The discontinuation of the current SIM card would save some significant cost for the mobile operators, this is because while current SIM cards still may be suitable for complex devices, there are yet some costs additional to a SIM card, cost that accrue from the production of SIM cards, hence, this may be preventable with use of soft-SIM.
The soft-SIM phenomenon is a win-win situation for the subscribers and the operators. It is not just consumers who stand to benefit but also mobile networks who stand the chances of reaching remote geographies. The consumers

would not have to worry about misplacing data and would never have to go to the vendor outlets to purchase a new SIM.

In addition, IoT supported product manufacturers (for example, connected car or wearable manufacturers) would have the capacity to form devices with "blank" SIM that could be activated in the destination country. This functionality would make for easy connection and permit manufacturers to offer new products in new market segments. Again, appliances manufacturers may be able to take control of the relationship with the customer because soft-SIM, at least technically, discourages intrusions of mobile operators from the end-to-end relationship. Soft-SIM also frees up space in the devices which gives manufacturers an opportunity to develop even extra features using the space once occupied by traditional SIM cards.

The purpose for the soft-SIM, as postulated by Elaheh (op.cit.57) is achieved when a chip has the capacity of downloading of the SIM applications in terminal. The Secure Element is not an UICC but also use instead of UICC and it is a dynamic location to store information and to download applications via a secure manner. The Secure Element is a smartcard module like a secure SD memory card bonded to the motherboard of terminal that could be part of microprocessor chip to install SIM application.

2.4.1   Challenges of Soft-SIM

While soft-SIM promises numerous benefits, there are yet some disadvantages attributed to soft-SIM. The soft-SIM platform could be more flexible and convenient for the users but it could be challenging to ensure the same level of security. According to Whatphone plans article on soft-SIM in Australia, it is anticipated that soft-SIM will fully make the consumers take over supremacy and power over their service providers. Additionally, there is complication of establishing the authorization of subscriber as the write and read entrance to the embedded SIM is trusted by genuine admission to strictly permitted subscribers. However, the challenge here becomes who can be defined as authorized personnel? Hence, during SIM downloading, the concern

is duplication and copying that may occur, yet, another challenge is to prevent copying of the SIM and it's misused.

Still to come, soft-SIM as indicated in related literature appears to be flexible, moreover, convenient for the subscribers but it could be challenging to ensure the same level of security. Prior literature asserts that soft-SIM otherwise known as software SIM had not really gained popularity over the years because of security fears. Elaheh (op.cit.56) suggests that bearing in mind the nonchalant attitude of Mobile Network Operators towards Soft-SIM, there is no extensive worry on their development and technologies. The mobile operators may continue to shy away from adopting the innovation due to the fact that mobile network operators are not sure about the associated safety procedures and intricacies of soft-SIM.

In addition, Elaheh (op.cit.61), have argued the success of soft-SIM specifically because of loss of identity of the mobile operators. The question is as to whether the new disruption of SIM will be accepted by the mobile operators. Also at the moment, the mobile network operators enjoy the benefits that emanates from the contents and contexts of their offering, such as the billing of subscribers on the SIM card, whereas the expected new technology might not guarantee operator`s full control on the access and billing on the SIM, there may be less avenue for the mobile operators to make charges for their offerings. The existence of the physical Subscriber identity module may be more or less inconsequential.

Mobile operators are worried over the security of their credentials and the interference in security that may come up because of use of soft-SIM. This is because the soft SIM operating system is relatively vulnerable to hacking than hardware. This could expose the operator profile to the risk of hacking activity. Any SIM platform that is not founded on the safety of hardware and software security stands a risk of frequent attack by the hacking community. Minor security interference may cause a serious loss of customer confidence in the security of operator systems. There is security synergy when there are two elements providing security, hardware and software, both providing protection.

2.4.2 Soft-SIM new value chain system

The entire customer package and in store experience may also be altered. For example, soft-SIM disrupts subscriber`s need to go to a store and acquire a SIM card when establishing a business relationship with service provider. Considering that the over the counter interactions are ample avenue to influence customer decisions, operators will need to assess the potential impact of losing this customer touch point and consider new ways to attract customers to their sales outlets.

Logistics There will be need for reformation of many services; the customer-service and logistics will be widely affected. For example, safe communication procedures for profile PIN delivery will be required.

Churn and loyalty

The customer may be able to easily migrate from among the mobile operators, and slightest short term promotions may trigger swap of the mobile operators. This means that churn between operators in a strong prepaid ecosystem will likely increase and may result to unhealthy rivalry. Nevertheless, this does not necessarily mean that a customer who is not locked into a contract will churn networks more frequently or spend less. Consumers may still select a deal that offers a superior user experience and satisfactory call quality. Satisfied users will likely be loyal to the operator as long as they are locked-in customers.

On the other hand, Soft-SIM's impact may be greater in markets with more prepaid customers than in markets with a high share of subsidized devices. While appliances subsidy levels will remain an important driver of customer loyalty in developed markets, investment in device subsidization expectedly may fall dramatically in future, approximately 20 percent of all appliances sold to less than 8 percent in 2020 (Meukel,2016).

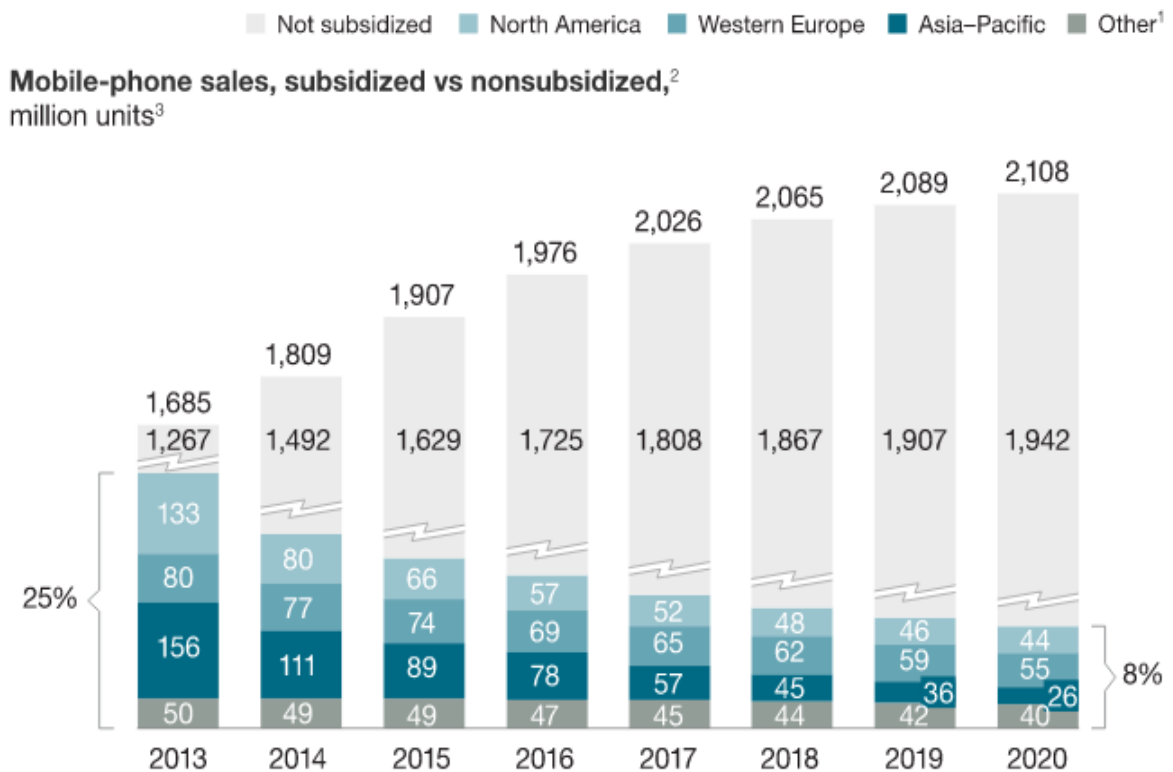Sales of subsidized devices are expected to decline through 2020.

| ☐ Not subsidized | ☐ North America | ☐ Western Europe | ■ Asia–Pacific | ■ Other[1] |

Mobile-phone sales, subsidized vs nonsubsidized,[2]
million units[3]

Figure. 8 Declined of sales of subsidized devices by 2013-2020 (Meukel 2016).

Of recent, with the idea of soft-SIM, many business models have evolved around soft-SIM. For instance, Meukel (op.cit.2016) argued that Wholesalers dealing on numerous mobile operators within the ecosystem could offer plan selection without disclosing which network is providing the connectivity. The customer might then be auctioned unexpectedly among network operators for a period. Electronic profiles could even be switched among mobile operators blamelessly for the client.

In addition, there is an assumption of interference of Social media and Internet-content package with the soft-SIM innovation. With the emergence of VoIP that provide alternative mobile telephone call services, the traditional mobile operator plan schemes may experience impending disruption on the profitable aspect. Aside offering competitive rates, new players may further increase margin

competition by offering some after-sales incentives such as refunds of unused, prepaid minutes in their pricing models.

There is speculations that GSMA is working with global network operators to develop a standardized reference architecture for the implementation of soft-SIM technology. The forthcoming trend may lead to extensive industry adoption of soft-SIMs in the near future. This trend may result to disruption in the external and internal business environment. Concerning these, new entrants, new sales and service models will determine soft-SIM's effect on the mobile-telecommunications market in future. Revenue is at stake, and operators' approaches to developing plans, shared data plan portfolios, potential new revenue streams, and handset support strategies across many markets will play a big role in how they fare in the new soft-SIM ecosystem. Whether an operator decides to take a role as an early adopter or an early majority, an overall strategy and associated initiatives need to be shaped thoughtfully now.

2.5. Soft-SIM security

Considering that the idea of Soft-SIM depends not just on a physical SIM card but on a software platform, it is important to ensure the safety of the medium or platform through which they are downloaded. Malware and other threats may pose serious security problem on the profile of the subscribers.

Wireless Network Authentication

The objective of this idea as quoted to have been invented by Schell.S (Elaheh op.cit.69) and proposed by Apple, is to enable devices of subscribers to have legality services. This technological trend has been claimed to be one of the answers to Soft-SIM authentication. Soft-SIM security management therefore, require that the mobile operators enhances enabling environment to access the services efficiently.

3   RESEARCH DESIGN AND LAYOUT

Typically, every research work follow a set of stages, from the theory development/hypothesis testing till final conclusion. This is known as research design. Yin (op.cit.26) views research design as the consistent order that connects the realistic data to a study´s initial research questions and, certainly to the findings. In a similar note, Bryman & Bell (2007, 40) define research design as a structure for collecting and analyzing data.

Often times, novice researchers tend to interchange the concepts of research methods and research design to mean exactly the same thing. Whereas, there is division between them. While the research method(s) is/are technique(s) for gathering data for example the qualitative or quantitative methods. The research design indicates the level of priority of the research process or stages according to the researcher´s preference. The five components of research design as highlighted by Yin (op.cit.27) include:

I.   **The questions of the study;** for this research, the question is how the telecommunication industry can adopt the soft-SIM? This is in consideration of the evolution of SIM card over the years.

II. **The proposition of the research;** this refers to the assumption of the thesis, however, this research is more of exploratory research and dwell more on theory development.

III. **The thesis unit of analysis;** this thesis attempts to ascertain how soft-SIM can be used in the telecommunication industry as well as why the disruption is worth it. The development of SIM as well as the benefits and challenges are discussed in chapter two. The studies did not cover everything about innovation as a topic, it dwelled on disruptive innovation and emphasis is on soft-SIM as a disruptive innovation over existing SIM card such factors like the research focus, scope are discussed.

IV. **The logic linking data to proposition;** this is the data analysis steps.

V. **The criteria for interpreting study´s findings;** in some re-searches, this entails statistical analysis, but such approach is not the best for case study. There are other important ap-proaches that can be used in a case study. For instance, com-paring and clarifying important opposing findings as against the positive findings. This is discussed in details in chapter five.

Bryman & Bell (op.cit.40) highlighted five different research designs:

I. Comparative Design.
II. Longitudinal Design.
III. Cross-sectional/Social survey design.
IV. Quasi-experiments Design. And
V. Case study Design.

The research focused on an explorative ´´Case Study research approach``. The reason for the choice of case study is to better give an in-depth clarifica-tion of the evolution of SIM and the future trends as well as the limitations of soft-SIM environment. These serves as a guiding steps to answering the re-search question ´´´How Telecommunication industry can adopt the soft-SIM``. In addition, Piekkari and Welch (2004, 111) propose that case studies ap-proach are preferred when the researcher has minor control over events and when the focus is on a present day phenomenon in a real life context. This approach has the capability to deepen the researcher´s understanding of SIM evolution so far and the likely future changes in the ecosystem, this is so be-cause it gives room for a longitudinal approach.

However, Yin (op.cit.19) affirms that case study is not limited to qualitative re-search method alone, the scholar argues that case study could be used in both quantitative research method and mix of both quantitative and qualitative methods. Furthermore, Piekkari & Welch (2004, 111) are of the view that case study approach suites international business research, where data is gathered from diverse cross-border and cross-cultural location.

This thesis intends to get a strong understanding of the future of SIM, comparing the evolution over the years. Especially considering the researcher`s limited knowledge about the research problem.

Case study is a thorough examination of a particular case, either single or multiple case study. It is practical study that examines in details, a real life phenomenon especially when the limits between phenomenon and context are not obviously defined (Yin, op.cit.18). Also, Simons (2009, 19) defined a case study as the study of a particularity and density of a single case, ensuring to understand its activity surrounding relevant occurrence. Bryman and Bell (op.cit.62) postulate that a research is said to be a case study when it provides a thorough and wide examination of a particular case. According to Bryman & Bell (op.cit.62), some of the widely acknowledged studies in business and management research are based on case study research.

Although case study format is quite cumbersome to undertake as opposed to some views. First, there are hitches that usually arise from making arrangement of meeting the resource persons for interview or discussion, this is because most times, they are either too busy to give you attention or in some cases are not just interested in granting interview at all. Personally, this hindrance is rather challenging to the researcher. Aside these, Case study design entails that the researcher develops a clear research question, in-depth understanding of the previous literature, well thought-out research design and exhibits good language skill.

Piekkari and Welch (op.cit.107) propose that a case study research need rich research questions, broad understanding of past works, good research design alongside theoretical bedrocks and most importantly outstanding language skills. Yin (op.cit.19) identifies the basic forms of case study research as single case study and multiple case study.
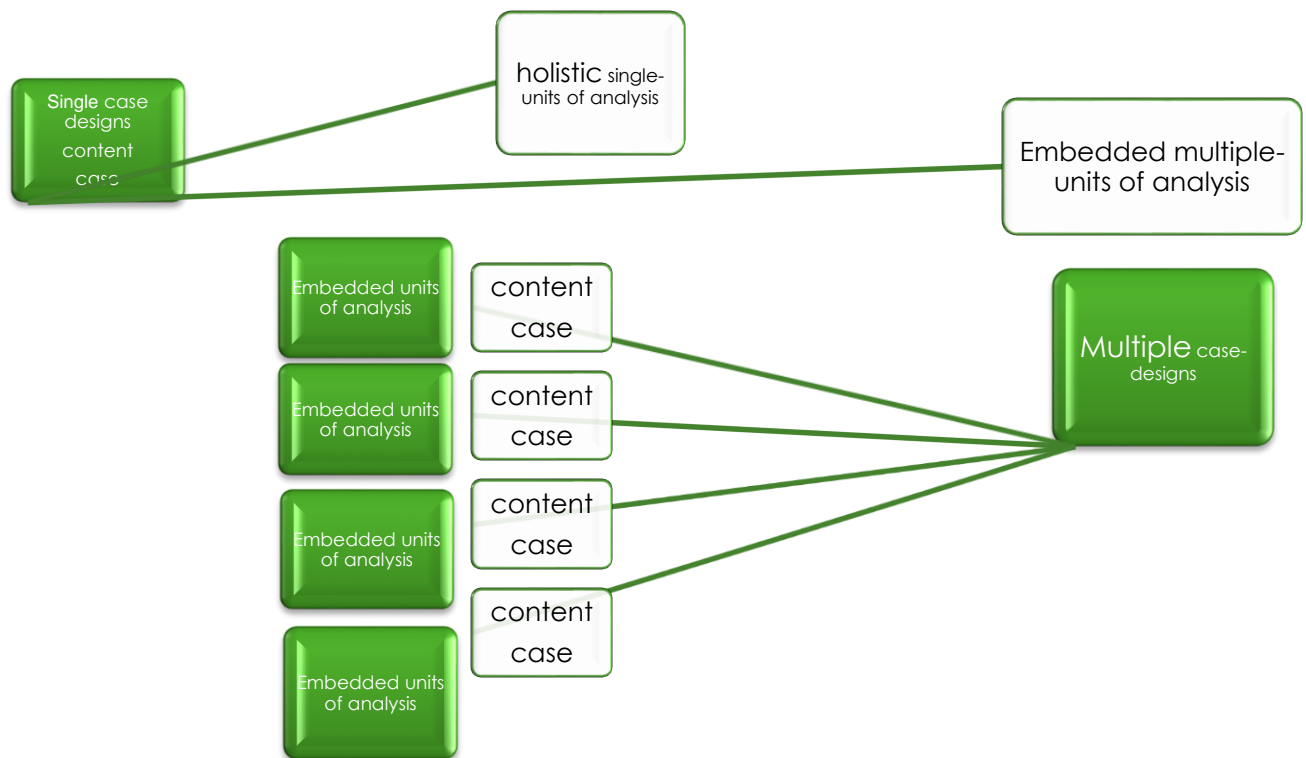
Figure. 9. Basic types of designs for case studies(Yin 2009).

Bryman and Bell (op.cit.64) are of the view that Case could be in different types depending on the context of the specific case:

I.   The critical case.

II. The unique case.

III. The revelatory case.

IV. The representative case.

V.   The longitudinal case.

Bryman and Bell (op.cit.63) Claim that a case study is a thing of concern to the researcher and the interest is to get exhaustive clarification on a case. Furthermore, promoters of case study research have argued that the objective is to develop a comprehensive analysis of a specific case, in relation to which

they then engage in a theoretical examination. Additionally, Bryman and Bell (op.cit.64) argued that case study research design is not limited to the study of a single case, pointing out that multiple-case study design is becoming popular in business and management research. However, this is not without a demerit, as the primary data are reconciled with the theory to arrive at a conclusion. The paramount issue is quality of the theoretical thoughts that the case researcher uses. Such issues like; how well do the data back-up the theoretical points that are produced? , is the theoretical analysis incisive? For instance; is there similarities among the conceptual ideas produced from the data? The concern here is not whether or not the findings of case study research can be universal but how well the researcher creates quality theory from the findings. (Bryman & Bell op.cit.64).

Likewise, Yin (op.cit.185-190) outlines what makes a case study exemplary. Among the features of a good case study according to Yin are that:

I. Case study must be significant, a situation where the investigator has limited resources, then the tendency is that the outcome might not be weighty enough and will be less relevant.

II. A case must be complete. This implies that a case cannot completed simply because the investigator ran out time or because the resources were exhausted, the procedures of a case must be richly completed.

III. An exemplary case should be able to compare alternative views of related topics. In order to balance the diverse perspectives, an investigator should be able to consider the alternatives that most seriously challenge the assumption.

IV. Exemplary case study must display enough evidence, the investigator should be able to manage the evidences in an unbiased manner, so that a reader can reach independent judgment of the benefit of analyzing the case.

V. A good case study must be structured in an engaging manner. The investigator should be able to structure the work in a way that draws the attention of the reader. To achieve this requires that an investigator be enthusiastic in putting up and communicating the case study.

The entire academic exercise attempts to address the research problem ´´How soft-SIM can be adopted in the Telecommunication industry`` Data were gathered by using unstructured and semi-structured interviews. These questions differ from one interviewee to another, and the order in which questions were asked vary also, this is because some answers may lead to another question instantly. Semi-structured interviews are primarily used in explanatory and case study researches to gain deep understanding of a real-life phenomenon.

Additionally, semi-structured interviews are used in exploratory studies to offer further information about the research area. Unstructured interviews, also known as in-depth or non-directive interviews, are designed to explore in depth, a general area of research interest. Interviewees talked freely about the issue on their behavior and opinions in relation to the research area. Such interviews are used in research to find out more about a particular issues and seek new insights. More than one type of interview was adopted in the re-search design,

3.1 Structure.

This studies adopted similar to Seinäjoki University of Applied Sciences writing structure, starting from the title page to the abstracts, then down to the last part of the process which is the Conclusion/Discussion. Below are the outlines
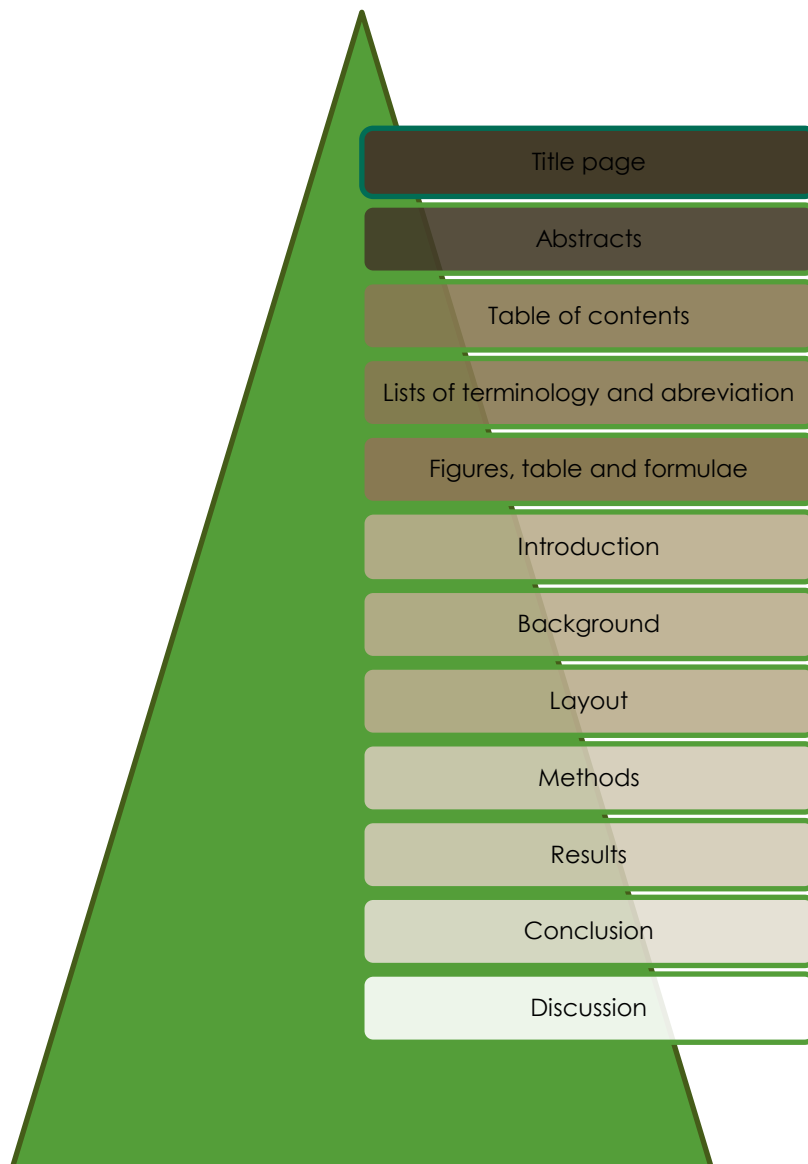
of this steps.

Figure.10 Thesis structure (Seinäjoki University of Applied Sciences 2013).

3.1.1 Methodology

This chapter explains how the research was carried out. The methodological style deployed to elucidate the research problems were discussed and given justification. There are several methodological approaches adopted in scientific research, among which include Quantitative, Qualitative (Bryman & Bell op.cit.28-29) and mixed methods approach (Cohen et al.2011, 22-23), which is a combination of both quantitative and quantitative strategies. The choice of which one(s) to use is perhaps not to bamboozle or impress the supervisor.

Piekkari and Welch (op.cit.509) argue that the choice of the research method(s) to be applied is dependent on the ontological, epistemological and methodological ethics of a given research to be used. This correspondently, must justify and underpin successive examination and explanation of data. The duo further claim that not only will there be a uniformity in the research problem, research design, methods of observation, measurement and analysis but they should also be congruent with the ontological and epistemological view of the researcher. Consequent to aforementioned submissions, it can be argued that there are some factors that affect business research. The figure 15 summarizes these factors.
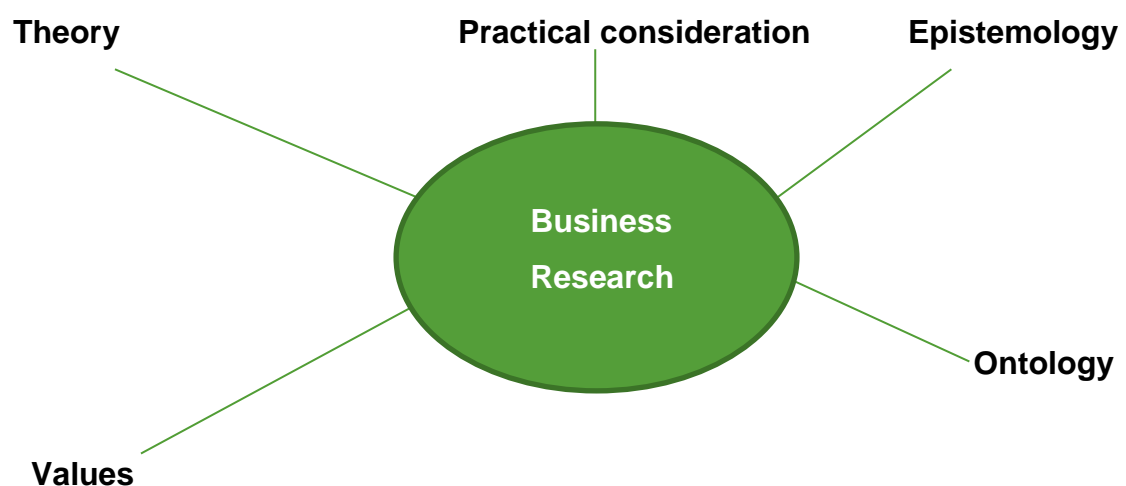
Figure. 11 Influence on Business research (Bryman & Bell 2007).

There are significant difference among qualitative, quantitative and mixed research methods, each represents unique research strategy and has remarkable uniqueness. For instance, Bryman and Bell (op.cit.28) quoted past writers to have suggested that the difference between quantitative and qualitative strategies go beyond assertion that quantitative deals with numbers and the later deals with words. Rather they vary with the epistemological root. The table below outlines some of the ways in which qualitative and quantitative research do vary:

Table.3 Variance between Quantitative and qualitative methods (NIHR RDS 2009).

Qualitative methods	Quantitative methods
Focuses on people, different perceptions of reality	Uses general laws to describe and examine reality
Describes complexity by using realistic phenomenon	Describes complexity through summarized definition of the subject matter
Observes behavior in a natural environment, uses people`s information as data and does not manipulate the data	Manipulates independent variables and control extraneous and nuisance variable
Concerns information on personal experience or unquantifiable data	Uses statistical tools to quantify data in such a way that can be accepted or refuted
Describes or interprets data in a way that could lead to new theory formulation	Relates to cause and effect and uses experiment premise for acceptance or disapproval
High flexibility and systematic research process	Entails earlier definition of the research process

Qualitative research relates to developing explanations of social phenomena. That is to say, it aims to help us to understand the social world and why a phenomenon is the way it is. According to Hancock et al (2009, 7) qualitative research is related to the social aspects of our world and seeks to answer questions about: ·

I. Why people behave the way they do ·
II. How opinions and attitudes are formed.
III. How people are affected by the events that go on around them ·
IV. How and why cultures and practices have developed in the way they have.

The researcher´s choice to use qualitative research is due to a number of credits to this research approach, though critics have resisted the idea of qualitative research approach because of a number of reasons, for instance, according to Bryman and Bell (op.cit.404), researchers that undertake partici-pant observation frequently adopt qualitative interviews, however, as they col-lect, analyse text and document, there is considerable inconsistency in a col-lection of data among core qualitative studies. Additionally, Critics argue that the link between theory and research is somewhat more unclear than in quan-titative research. Also, Piekkari and Welch (op.cit.7) suggest that qualitative research is criticized of not considered as a legitimate science.

Similarly, Piekkari and Welch (op.cit.513) argue that their contemporaries of the positivist view, are apprehensive that qualitative researchers adopt rela-tively smaller samples, sometimes with a sample, however, the duo debunked this claim by quoting that some of the best studies in management and inter-national business were done on very small samples. Subsequently, qualitative research is more than just measurement of noticeable behavior (the ´´What``) it seeks to clarifies the meaning and beliefs underlying actions (the ´´Why`` and ´´How``)‚ It gives answer to confusing problems and ambiguous issues that are typical for international management research. And very imperative is that the use of semi- structured interview allows the researcher to deepen the interview and gain better elucidation.

Figure.16 outlines sequence of steps that demonstrate the qualitative re-
search process:

Figure.**12** Qualitative research process (Bryman 2007).

This research adopts a qualitative research method due to the nature of case
study, the researcher possesses mediocre knowledge of the research prob-
lem and needed in-depth exploration of the case from the telecommunication
stakeholders and professionals in the sector, therefore data and findings were
collected through interviews with top staff of two of the foremost telecommuni-
cation firm in Nigeria, Etisalat telecommunication and Airtel telecommunica-
tion respectively. In addition similar interview was granted by a profes-
sional/consultant in telecommunication sector in Finland. The diverse cultural
interviews of this research is intended to produce a rational cultural report.
Piekkari and Welch (op.cit.8) claim that qualitative research allows for deeper

cross-cultural understanding and is less likely to be culturally bias.Also included are online sources, printed materials from academic and business Libraries.

3.2 Collecting the empirical data

In this section, the method of collecting data is discussed and justified. Bearing in mind that the researcher adopted qualitative approach to this research, there are various methods of data collection in qualitative approach, this of course is dependent on the research methodologies and design used by the researcher. Different authors suggest numerous data gathering platforms among which is interview, in a similar way, interview method was used in the study research, however, the researcher will outline a handful of them and discuss extensively on interview as a method of gathering data.

Below are some of the methods of qualitative research data collection as outlined by Hancock (op.cit.16):

I.   Interviews.
II.   Focus groups.
III. Observation.
IV.   Collection of documented material such as letters, diaries, photographs.
Collection of narrative.

Interview

The term ´interview` is used in a number of ways, depending on the context it is used. Interview is not an ordinary everyday discussion neither. Journalists use this terms quite often but not exactly as in the perspective of scientific research approach. Education research methods scholars, Cohen et al (op.cit.409) suggest that interview is a flexible tool for data gathering, allowing multi-sensory channel to be used. Piekkari and Welch (op.cit.186-187) acknowledged some reasons that warrant the use of interview in international business research. Firstly, they claim that interview-based research studies is best suitable for exploratory and theory building studies, adding that the re-

searcher studies the issues with little or no pre-existing theoretic bias. Secondly, Interview-based research may be used to maximize research studies when there is a small population of available respondents/interviewees. This means that the researcher must explore in-depth data collection when the breadth is not attainable. This does not imply that the researcher unnecessarily deepen the interview to overcome the small population, rather, the researcher sees interview as an avenue to gain the quality of information from the interviewees. Thirdly, Interview may permit researchers to build understanding with the interviewee thereby giving room for honest and accurate information, this results to insightful foundation for follow-up studies.

The researcher approached the interviewees both in (Nigeria and in Finland) without preconceived premise to adjust or validate theory, this is in order to avoid prejudice and maintain objectivity in the theory development. This is also owing to the fact that the researcher has limited knowledge of research context. The researcher developed a semi- structure questions and interview guide to ensure that the questions are within the context of the enquiry. Piekkari and Welch (op.cit.192) suggest that an interview guide is a check list to assist researcher in ensuring that all topic areas are covered in the course of the interview.

3.2.1 Sampling

The researcher implemented ´purposive sampling`, bearing in mind that this is a semi-structured interview, the choice of the interviewee is on the basis of their likelihood to rich development of the subject. The researcher is interested in persons in the field of the subject Matter and professionals than larger immaterial sample population.

4 RESULTS

In this section, the data collated will be described, classified, categorized and presented in a single sequential order, as proposed by Dey (2005, 54), see fig 17. The studies engaged four major opinions on the soft-SIM prospect, three interviewees (primary data) and literature (secondary data). For the sake of clarity, the researcher shall categorize the interviewees according to:

I.   Interviewee one. (Nigeria).

II.   Interviewee two. (Nigeria).

III. Interviewee three. (Finland) respectively.

Interviewee one asserts that soft-SIM would be a milestone achievement if implemented in the telecommunication sector, however, she acknowledged some challenges attributed to her firm`s typical social environment. Among these challenges are; Illiteracy, preponderance of Laggards within their firm´s social system. According informant one, high level of illiteracy would be one of the major threats to soft-SIM success within their external environment, greater percentage of their customers may find soft-SIM too sophisticated to use. At the moment, most of such customers still see smartphone to be complicated. Another threat according to informant one is that many of their customers may take too long to key into soft-SIM ideology because it is new innovation.

Interview two is of the view that the level of the soft-SIM awareness is poor within Nigeria, so more awareness is needed for and by the stakeholders.

Interviewee three suggests that soft-SIM would make a landmark development if adopted, and that telecommunication stakeholders have been deliberating on this innovation over the years. He further noted that soft-SIM could create new value chain system such as hospital diagnostic equipment that could use soft-SIM to save information to cloud. However, he outlined reasons why telecommunication key players shy away from endorsing this agitation over the years. According to this interviewee, the telecommunication firms have continued to repudiate this innovation for fear of losing ´´**customer**

Lock-in``. This is basically because, at the moment, the customers are tied to the mobile operators through the physical SIM card and this is one of the major ways operator can charge for this service. The resistance of operators is for fear of losing customer´s loyalty due to the flexibility of soft-SIM. He further indicated ´**churn`** as another basic factor for the fear of adoption of this innovation by the telecommunication firms. A "churn" in the telecommunication industry suggests the percentage of subscribers migrating from a specific service to another in a given period of time.

Correspondingly, Whatphoneplan (op.cit), claim that soft-SIM when launched will shift control from the mobile operators to the customers. Also, Meukel et al (op.cit) maintained that churn through mobile operators is inevitable when soft-SIM emerges. This is to say that informant one and three are in agreement with the major opinions of the secondary data. The combination of likely internal and external factors affecting the success of soft-SIM is presented below in SWOT analysis.
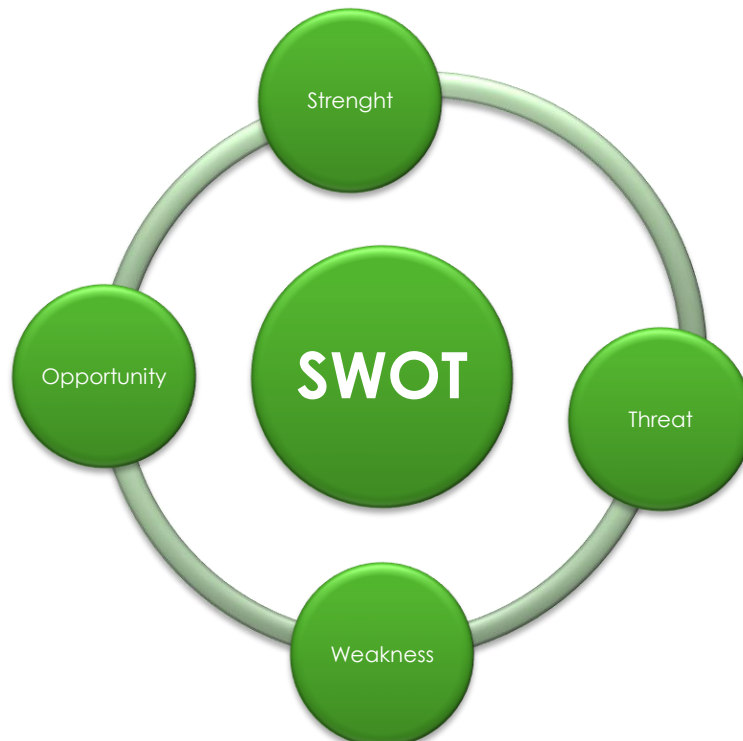

Figure .13 Soft-SIM SWOT

Table 4. Soft-SIM SWOT analysis

Strength	Weakness
-Global roaming services	**-Sluggish adoption**
-Subscribers have more power to make choices	**-Might be complicated for some customers in less technological advanced area.**
	-Diminishes strength of mobile operators
	- Government policy and regulation
Opportunity	**Threat**
-New value chain such as IP address supported hospital equipment	-Churn through mobile operators
-Easy to activate	-Unhealthy rivalry among operators
-Saves cost for subscribers	
Flexible switching of operators	
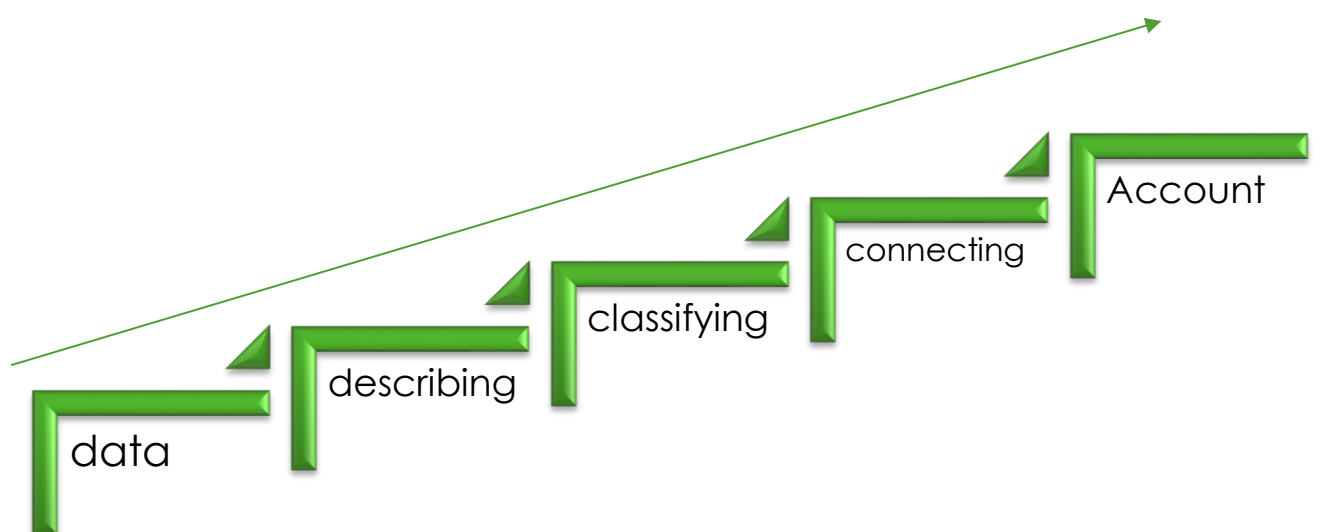
Figure .14 Qualitative analysis as a single sequential process (Dey 2005).

Also, the success of technological innovation is not dependent on the innovation alone. According to Dasgupta (2011, 270), technology innovation breakthrough is determined by three major factors; technology strategy, technology innovation and organizational environment. This implies that such factors like business strategy and business environmental factors play huge role in the success of technology innovation like soft-SIM. Figure 19 below summarizes these factors.

Figure 15. Technological innovation framework (Dasgupta 2011).

In addition, it is imperative to examine the likely external factors that will make or mar the success of soft-SIM. However, this study did not dabble into discussing the individual PESTEL factors in details, rather will point out the likely PESTEL factors that will determine the success of soft-SIM. Dasgupta (op.cit.269) suggest that new technology encounters not just financial challenges but also political, cultural challenges and more. Similarly, Team FME (2013, 6) publication, asserts that many of these factors cannot be controlled by firms involved, the factors are known as PESTEL analysis.

4.1. Soft-SIM PESTEL analysis

PESTEL denotes; political, economic, social, technological, legal and environmental factors that surrounds the survival of innovation. Once innovation is internationalized, the aforementioned factors raise questions that must be addressed efficiently. Such questions like;

> What are the main political challenges?
>
> What are the important economic factors?
>
> What does the social life look like?
>
> What is the technological level of the society?
>
> What government policies and laws affect innovation?
>
> What environmental threat does the innovation pose?

Political factors includes: such issues like stability of government, government corruption, restriction of trade, employment rate, bureaucracy of government.

Economic factors: under here are GDP and GNP, cost of living**,** tax, exchange rate, inflation and deflation, unemployment rate globalization.

Social factors: include Education, ethics, lifestyle, demography, cross-cultural, Historical background.

Technology factor: here are factors like Research and development, production efficiency, Production efficiency, intellectual property.

Legal factors: Taxation, regulation, duties, import and export make up this factors.

Environmental factor: In this factor are Environmental consequences, waste management, and general hygiene.
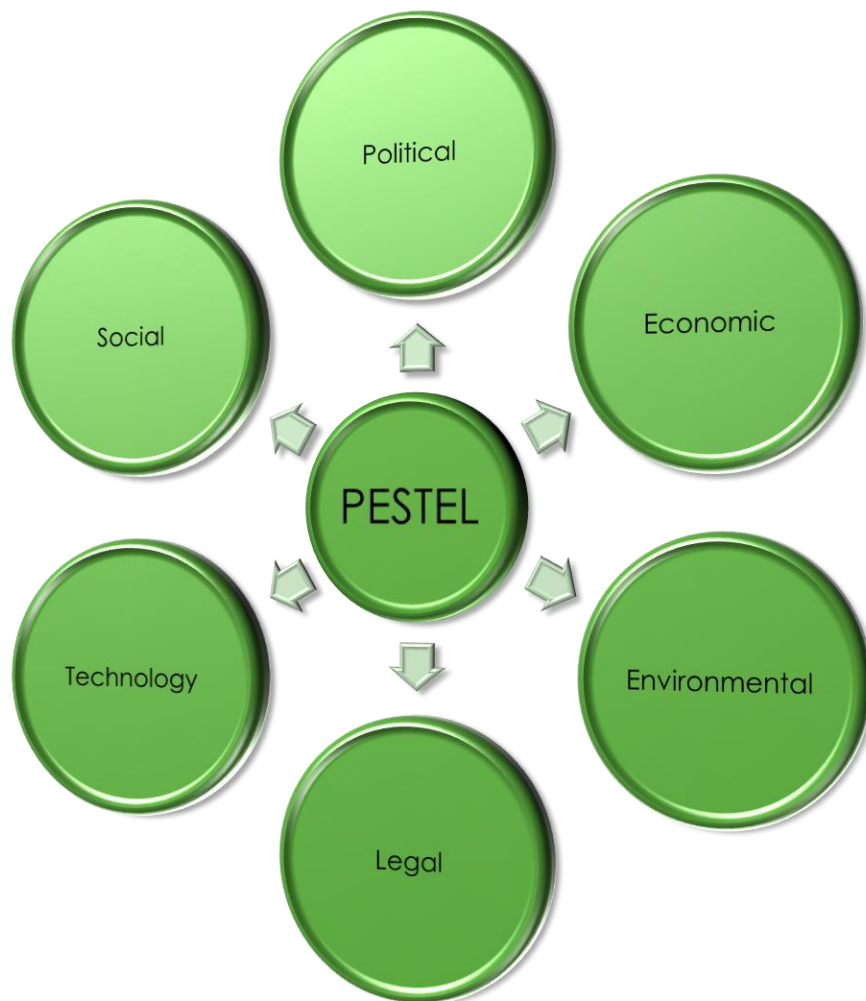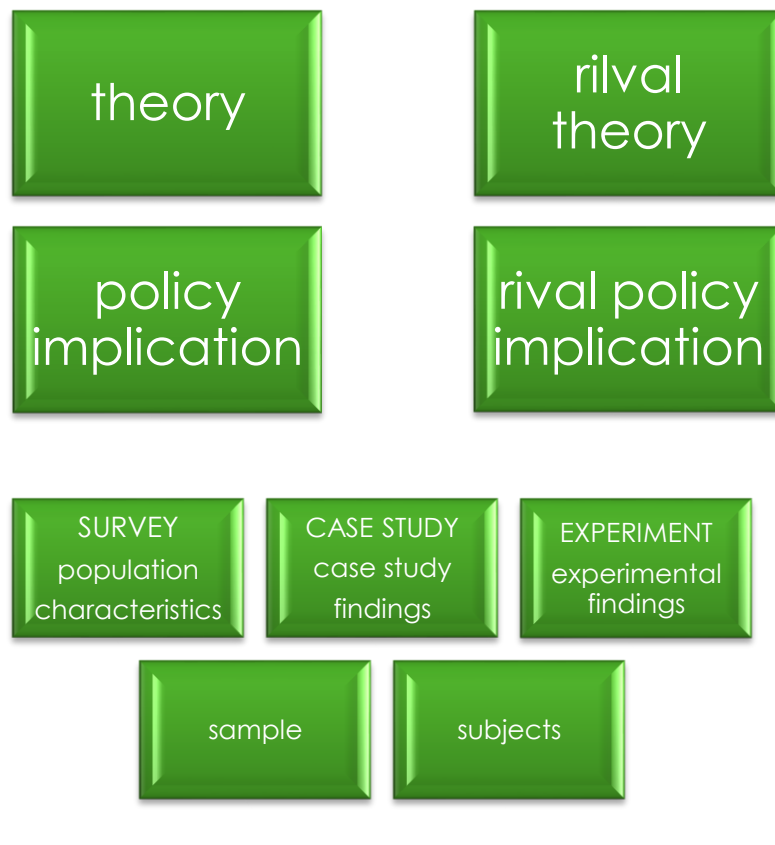
Figure 16. PESTEL analysis (Free Management E-book 2013).

4.1.1   Discussion

The inferences on the studies are drawn using the rival theory as postulated by Yin (op.cit.39), also the earlier established literature is used as a yardstick to match primary data (analytic generalization).

Level two

theory	rilval theory

policy implication	rival policy implication

SURVEY population characteristics	CASE STUDY case study findings	EXPERIMENT experimental findings

sample	subjects

Level one

Figure. 17 Making inferences (Yin 2009).

The author encountered, numerous challenges in the cause of gattering primary data (interviews). Most especially, securing appointments with the informants. It is either the informant is too busy to grant interview or he/she is simply not interested. For instance, all the efforts made to keep an appointment with the product development manager in one of the foremost

telecommunication firm in Finland proved abortive. Series of mails and text messages were sent, yet no appointment or opportunity for interview worked out. Also, some resource persons did not obviously comprehend the concept discussed, the topic seems to be new and no useful information was gotten from such informat. Basically, the primary data has limitations because of insufficient resource person and the researcher hopes that successive improvement will be made on this theory by other studies.

Again, the concept of soft-SIM is not popular yet, therefore, limited litrature could be accessed on soft-SIM.

5 CONCLUSION

The series of disruptions of SIM since early 90s, resulted to reformations in sizes of SIM card. Also, the next generation of SIM is anticipated to come in software form. This gives a positive impression and appears like innovatory step towards better SIM formula, however the study finds that the idea of soft-SIM has not been widely accepted by mobile operators because of the following factors.

I.   Mobile operators see soft-SIM idea as a bad one, because of fear of losing customer´s loyalty. Mobile operator´s Customer lock-in is under threat by the idea of soft-SIM because of the flexibility of soft-SIM. Besides the assertion;

> ´´The soft SIM when released on all next-generation smartphones and tablet devices in the near future, will remove all power from the telecom companies and place it all firmly in the hands of Australian consumers``.

(Whatphoneplan Australia).

II.   Churn is a major bane of soft-SIM adoption. This is a situation where the subscriber often switch mobile operator´s, depending on which is presumed to provide better offer at the given moment. Though, this is more pronounced where the prepaid plan is used.

Soft-SIM adoption in the telecommunication industry is dependent on the unanimous approval by the Mobile Network Operators and widespread acceptance in the customer`s mainstream market. However, despite these aforementioned hitches, some scholars insinuate possibility of adoption of soft-SIM in the telecommunication industry in future. According to Gans (2016, 18), new technological breakthrough initially takes so much time to improve on the success, however, little effort at some point triggers success.
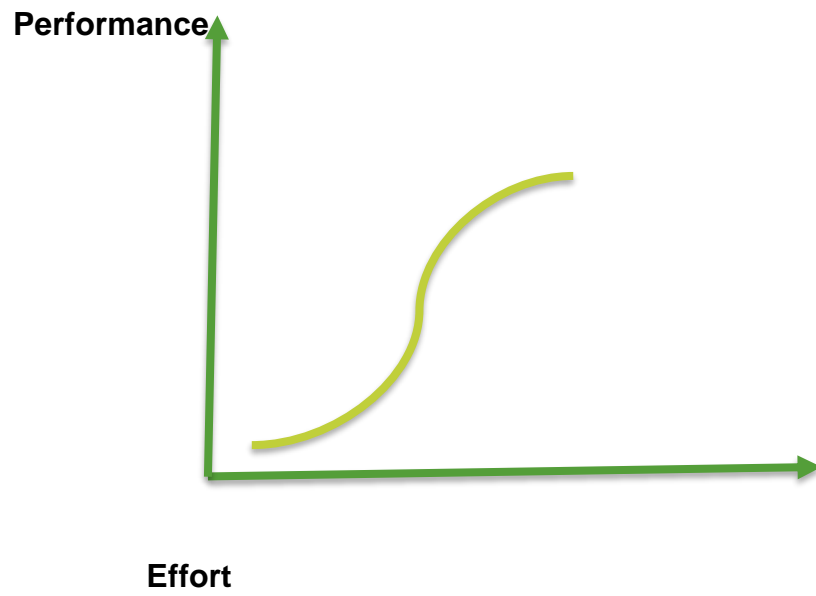
Figure. 18 New technological success (Gans).

REFERENCES

Banks, R. 2014. Mobile industry review, Apple SIM: bad news for mobile operators in operators' opinion.

Battu, D. 2016. Communication Network Economy. Great Britain. John Wiley and sons' publisher.

Clayton, M. Christensen, Scott, D. Anthony & Erika, A. 2004.seeing what is next: Using the theory of innovation to predict industry change. Harvard business school Publishing Corporation.

Cornell University. 2016. INSEAD and WIPO. The global innovation index: winning with global innovation. Ithaca, Fontainebleau and Geneva. Beijing. World intellectual property organization (WIPO).

Dasgupta, M. Gupta, R. k. & Sahay, A. 2011, Linking technological innovation, technology strategy and organizational factors. Los Angeles. A review by SAGE publication.

Dey, I. 2005. Qualitative data analysis: User friendly guide for social scientists. United Kingdom. Taylor and Francis e- library.

Elaheh, V. 2013. Evolution of SIM to e-SIM. Norwegian University of science and technology.

Gans, J. 2016. The disruption dilemma. Cambridge. MIT press.

GSMA intelligence: Understanding SIM Evolution. 2015.

Hancock, B. Ockleford, E. & Windridge, K. 2009. An introduction to qualitative research. The NIHR RDS EM/YH.

Hang, C.C. Chen, J. & Dan, and Y.2011. An assessment framework for disruptive innovation. Vol 13. No 5. Emerald publisher.

Jackie, F. & Raskino, M. 2008. Mastering the hype cycle: how to choose the right innovation at the right time. Massachusetts. Harvard business school.

Jia, X. Jiang, M. & Lei, S. 2016. Research on cooperative innovation behaviour of industrial cluster based on subject adaptability. Hindawi Publishing Corporation.

Ken`s Tech Tips. 2017. Your smartphone SIM types: standard SIM, Micro SIM and Nano SIM. United Kingdom.

Latzer, M. 2009. Information and technology innovations: radical and disruptive. Vol.11. (4). Los Angeles. SAGE publications.

Linkner, J. 2014. The road t reinvention: how to drive disruption and accelerate transformation. First edition. San-Francisco. Jossey-Bass.

Meukel, M. Schwar, M. & Winter, M. 2016. E-SIM for consumers: a game changer in mobile telecommunication.

Moore, G. A. 2005. Dealing with Darwin: How great companies innovate at everyday phase of their evolution. First edition. USA. Portfolio.

Nambisam, S. Lyytinen, K. Majchrzal, A. & Song, M. Digital innovation: reinventing innovation management research in digital world. MIS quarterly vol. 41. No 1 pp223-238.

Organization for Economic co-operation and development (OECD): Innovation for development. 2012.

Penz, R. 2004. Analysis and design of a SIM base authentication solution for

WLAN. Agbabedatum.

Rogers, E. M. 1983. Diffusion of innovation. Third edition. London. Collier MacMillan publisher.

Rogers, E. M. 2006. Diffusion of innovations. Fourth edition. New York. Free press.

TEAM FME. 2013. PESTEL analysis: strategy skills. Free management e-book.

Trott, P. 2005. Innovation management and new product development. Third edition. Edinburg gate. Pearson.

Whatphone Australia: soft-SIM the future of Australian mobile phone SIM card.

Wolfgang, R. & Wolfgang, E. 2010. Smart card handbook. Fourth edition. United Kingdom. John Wiley and sons Ltd.

Yin, R. K. 2009, Case study research: Design and methods. Fourth edition. London. SAGE publication.