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# Disruptive Innovironment

A study to examine the disruptive innovation environment in Africa  
in order to make successful business propositions

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<p>The purpose of the present Master's Thesis study was to examine the disruptive innovation environment in Africa in order to be able to make successful business propositions. The study was commissioned by Nokia Oyj. Nokia Oyj is a global telecommunication company, which was once a competitive mobile phone manufacturing giant and a market leader in innovation technology in the mobile industry.</p> <p>Qualitative research methodology was utilised in this study. The qualitative research data consisted of in-depth interviews with key influencers of innovation in the African region. The research findings gathered with the aid of questionnaires enabled Nokia Oyj and other key global collaborators to implement a 2 year pilot project to ascertain and validate the research findings. The results at the end of the 2 year project implementation revealed a high correlation between the research findings and actual implementation results. Both the interviews and the actual implementation of the project indicated that challenges and scarcity of certain required resources has propelled Africa to be a "disruptive innovirement".</p> <p>The term "disruptive innovirement" describes the stimulating socio-economic factor in the environment that drives a need for disruptive innovations, which develop products and services that take root initially in simple applications at the bottom of a market and then relentlessly move up the market, eventually displacing established key products that were historically expensive, complicated and inaccessible and replacing them with products that are accessible, often affordable, uncomplicated and available to a much larger population. All respondents indicated that this process is rapidly growing in Africa and has changed the dynamics of how global companies are currently strategizing to ensure they remain competitive and innovative in the region. This study reveals how simple disruptive innovations displace established competitors.</p> <p>The author recommends that management of Nokia Oyj and other global companies re-evaluate their practices of innovation and consider disruptive innovirement in their strategy planning. It is recommended that Nokia Oyj reopens the regional research office which would provide direct insight into current trends in the region and ensure that the company remains competitive in the targeted market.</p>	
Keywords	Disruptive Innovirement, Innovation, Technology, Africa

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## 1 Introduction

Innovation is a critical success factor for companies in today's competitive business world. Innovative firms can achieve higher growth and compete better than those that are not innovative. Innovation requires a desire to innovate, an innovation strategy, an innovative organization, and most importantly innovative people who will generate new ideas and turn these ideas into reality (Joe Tidd and John Bessant, 2009). Santos-Vijande and Álvarez-González (2007, p.514) argue that "innovations play a crucial role in the firms' future by following the rapid pace of markets' evolution". It is no surprise that management of technological innovation is one of the most demanding challenges today (Dodgson et al., 2008). This thesis takes innovation as one of its core topics.

Nokia Oyj (hereafter referred to as simply Nokia), a Finnish multinational communications and information technology company founded in 1865, was once known for its innovation, creativity and disruptive technologies. The customer promise of Nokia is "connecting people" and bringing disruptive innovations and technologies that "make us human". Currently the company focuses on large-scale telecommunications infrastructures, technology development and licensing. Nokia is also a major contributor to the mobile telephony industry, having assisted in development of the GSM and LTE standards, and was, for a period, the largest vendor of mobile phones in the world. Nokia's dominance also extended into the smartphone industry through its Symbian platform.

In recent years though, Nokia began to lose its position as a market leader on top of the charts in the mobile industry. The major factors for this downhill trend were the entrance of affordable low-end smart and mobile phones, and the demand for alternative applications within a mobile device. Also, the company's smartphone business was overshadowed by the growing dominance of Apple's iPhone line and Android devices.

The African market was a crucial and rapidly growing market for Nokia during the heyday of the company. Africa as a target market has consistently leapfrogged a state-of-the-art technology and has adopted advanced technology in the application areas. This is a result of the continent skipping the immediate prior technology in the global technology revolution. This adaptation has triggered a lot of disruptive innovation. Many companies

within Africa have tried to stay competitive and innovative by introducing disruptive technologies and thereby gaining a competitive advantage. This creative and innovative approach has boosted the African economies and triggered global companies to develop an interest in the African region.

The purpose of this study was to examine the “disruptive innovenvironment” (disruptive innovation environment) in Africa in order to be able to make a business proposition to Nokia. This study looks into what is triggering disruptive innovation in the African market, its dynamics with regards to the rapid unpredictable changes, why Africa is known as a disruptive innovenvironment and how businesses can plan strategically to remain competitive in such a disruptive innovative environment. The most common questions hereby are: What is next for Africa? And how should businesses plan strategically to be innovative and remain competitive in new markets like Africa?

Nokia initiated this study upon realizing that the company was losing ground in the African market and needed to better understand the disruptive innovation environment it was working in. Although the company had received numerous signals on the rapidly changing demands from its customers, the company was not fast enough to respond to these demands. Examples for these demands included a dual sim phone, cheap messaging services and the shift to bigger screen devices in the wake of the digital revolution and the bridging of the digital divide gap. The goal of this study is to create an overview on the demands and help create better solutions for the future. This was done by interviewing key influencers of disruptive innovation in the region, gathering facts and information about the disruptive trends, and by highlighting the key game changing elements, products or services that will be a trigger to disruptive innovation.

A great deal has been written about disruptive innovation and strategies, but very little has so far been researched on these topics in the context of innovative markets like Africa. This study will therefore also analyse a selected number of global businesses that are currently engaged in Africa and examine how they respond to the rapid change in the innovation environment. The study hereby aims to offer a better understanding of why global companies are currently setting specific business strategies for emerging markets.

## 2 Problem Statement

The objective of this thesis is to contribute to the discussion on disruptive innovenvironment. It examines this type of environment in the context of Africa, in order to be able to make business propositions for Nokia.

The study also comments on the following questions:

- Why is Africa known as a disruptive innovenvironment?
- What is triggering disruptive innovation in Africa?
- What is next for Africa?
- How can global companies plan strategically to be innovative and remain competitive in new markets?

Finally, this thesis analyses the research findings, makes recommendations and selects critical elements for disruptive innovations based on predictions for the future.

## 3 Literature Review on Innovation

This chapter presents an overview on the literature available on the topic of innovation. It reviews literature written about innovation, selects suitable theoretical references and other readings on innovation, and presents the work on “disruptive innovation”, as coined by Clayton Christensen and his co-authors. This chapter also discusses innovation management and reviews the core elements of innovation management. Furthermore, the chapter reviews Prahalad’s work on frugal innovation and takes a look into the current paradigm shift in innovation, which is internally coined in Nokia as “disruptive innovenvironment”.

### 3.1 Innovation

Innovation literally means “doing new things”. Creativity is the starting point for innovation, whereby creativity means the act of formulating new ideas about things. An invention does not become an innovation until it creates a clear and proper consumer delight and as such also has economic values that provide sufficient differentiation.

Baregheh et al. (2009, p1334) define innovation within the organizational context as “the multi-stage process whereby organizations transform ideas into new or improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace”. Drucker (2006) defines innovation in the context of business as the core process for every firm, and he suggests that the best approach in which a business can thrive in an environment of rapid changes is to innovate and convert the rapid changes into opportunities.

Innovation can also be defined as the introduction of significant technological and or technical changes, as well as changes in marketing, commercial, social, human resources, financial and organizational structures or administration (Medina et al., 2005). Therefore, it becomes clear that innovation goes beyond just the technological activities, even though discussions about innovation have mainly focused on things such as computer hardware, software, electronics and the internet, that makes life easier and better. As much as technology cannot be ruled out as an integral stimulator of change and a continuous contributor to innovation, other factors also play a critical role. The scope of innovation is multifaceted and includes the services, business models, the target market, the environment, ways of working and new user experiences.

Innovations can be classified as either incremental or radical. Incremental innovation basically means to “do what we do better”, while radical innovation means to “do something differently” (Tidd & Bessant, 2013, p. 26). Innovation with minor improvements and simple adjustments, such as adding new features to an already existing product, is known as incremental innovation (Rothwell & Gardiner, 1988), while innovation that triggers fundamental or revolutionary changes is known as radical innovation (Dewar & Dutton, 1986). Businesses are often encouraged to engage in incremental innovations for product development, while simultaneously exploring the next radical innovations in order to sustain the business in the long run. History has shown that businesses that only concentrate on incremental innovations have a higher risk of failure than businesses that also followed a path of constant renewal (Tidd & Bessant, 2013, p. 79). Businesses that effectively balance their allocation of resources to pursue both innovation directions have proven great successes in many extensive studies (e.g. Duncan, 1976; Raisch & Birkinshaw, 2008; Tushman & O’Reilly III, 1996).

Innovations come into being through the interaction of several forces, most importantly the need for change. The stiff and tough competition in the market drives the pull for innovation, as businesses need to innovate in order to survive. Drive of innovation can also be through a push which comes from new knowledge and opportunities in the market. Figure 1 answers the typical question on the origin of innovations and illustrates a wide range of triggers that result in innovation.

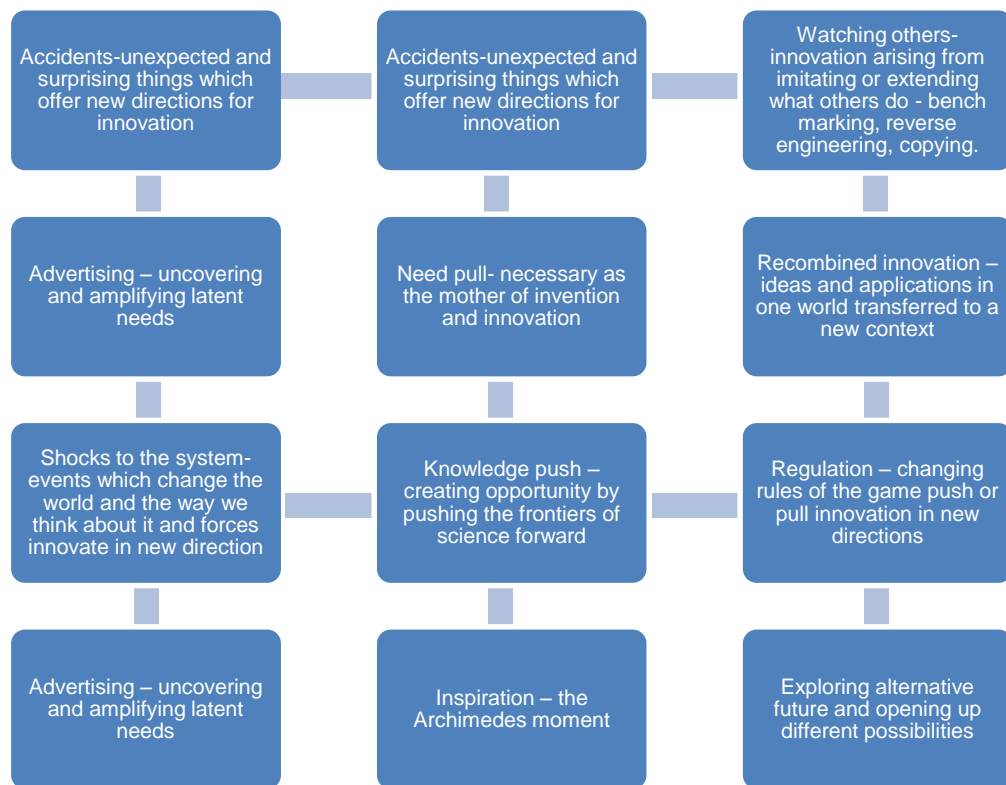


Figure 1. Triggers of innovation (based on J. Tidd and J. Bessant, 2009, 230)

Developing an innovation strategy is one of the most important cornerstones that businesses should consider, as innovation is the lifeline for the survival, existence and growth of any business (Camison, Villar-Lopez, 2012; Francis, Bessant, 2005). Considering the range of signals in the environment, it is critical for the success of innovation management to have a sound and appropriate system in place to effectively identify and acquire information relevant to their needs (J. Tidd and J. Bessant, 2009, p. 78-79). The ability to successfully scan the environment and determine the signals is mainly based on the business having an appropriate strategy, adequate resources and expertise. Many studies have shown that a strong capability for innovation brings a competitive advantage and long-term business success for companies. It is clear that high performing innovators are able to bring faster new and improved products and services to markets at lower



costs than their competitors. The ability to continuously generate innovations is one of the most critical capabilities in today's business environment (Elonnen et al., 2009).

### 3.2 Disruptive Innovations

Christensen (2000) divided innovations into two categories: sustaining ones and disruptive ones. He argues that industry incumbents often lead in developing and adopting sustaining innovations, where innovations first sustain the industry's rate of improvement in product performance and range in difficulty from incremental to radical. Christensen et al (2004, p. 270) clarify that many of the most profitable and important innovations are sustaining innovations, which simply take a good product or service and make it better. "Disruptive innovations", on the other hand, are defined as the process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors. Disruptive innovations redefine performance trajectories, and they are often created by industry entrants (Christensen, 2000).

Christensen (Christensen, 1997; Christensen, 2006) also used the term "disruptive technology". "Disruptive technologies" are wild and unexpected technological breakthroughs, which may first seem to be of limited interest, but eventually completely overturn existing products, and require corporations to radically rethink their very existence. Many scholars interchange the two terms "disruptive innovation" and "disruptive technology", but although there are similarities, they are different. What is vital to consider is the fact that there can occur technological disruption in the market, but not all disruption is necessarily innovational. The issue with disruptive technologies is that they do not always hit the market with a bang. Christensen moved from using the term "disruptive technology" to the more clearly defined "disruptive innovation", arguing that it was rarely the technology per se that was disruptive (or sustaining) but rather the use that companies made of it, the innovation that it enabled them to undertake. Disruptive innovative technologies offer particular benefits, which are normally simpler, more convenient, and less expensive, and they most often appeal to new or less demanding customers.

It is important to note that few technologies or business ideas are intrinsically sustaining or disruptive in character. These are extremes in a continuum, and the disruptiveness of an innovation can only be described relative to various companies' business models, to

customers, and to other technologies. This means that much depends on the implementation of an idea (Christensen & Raynor, 2003, p. 32, 122).

Generally disruptive innovation occurs over a long period of time. It redefines the traditional trajectory and often is a combination of new-market and low-end approaches. As Christensen & Raynor (2003, p. 34) describe, disruptive innovation does not attempt to just bring better products to established customers in existing markets, but rather aims to gain traction over time as figure 2 illustrates.

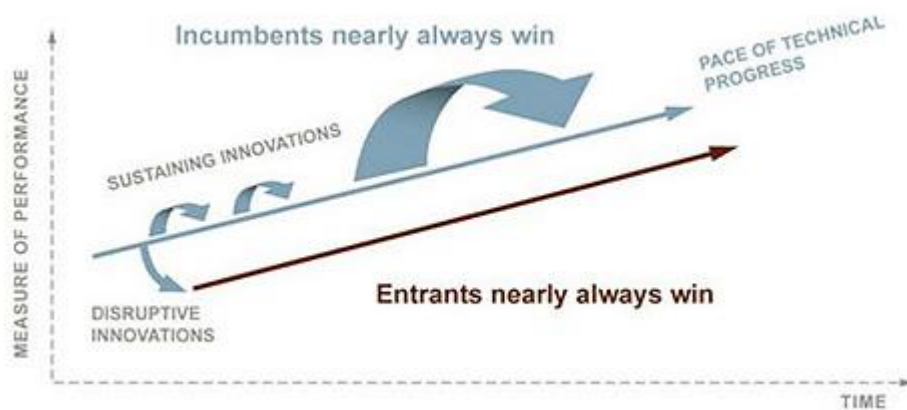


Figure 2. Disruptive innovation performance over time

Christensen & Raynor (2003) refined Christensen's original theory by further dividing disruptive innovations into low-end and new-market disruptions and was later reaffirmed by Christensen (2006), arguing that these two to be fundamentally different phenomena. Figure 3 depicts what Christensen and his co-authors categorized.

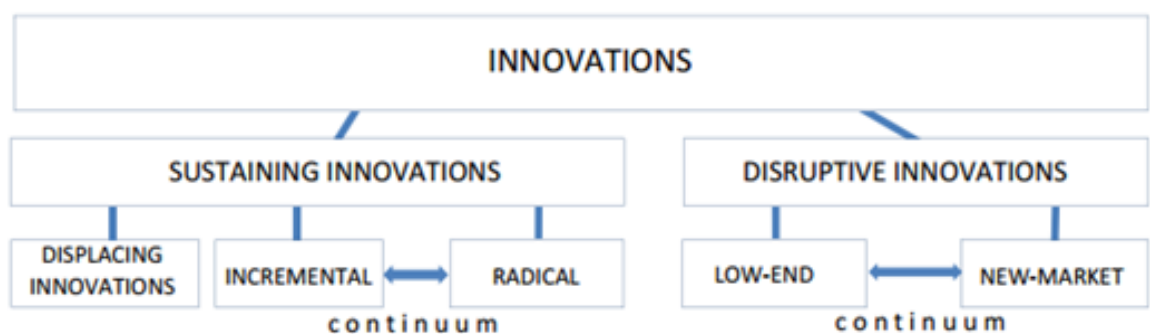


Figure 3. Innovation categories. Adapted from Christensen (2000); Christensen & Raynor (2003) & Christensen et al (2004).

A new-market disruption is an innovation that enables a larger population of people who previously lacked the money, time or skill, to now begin buying and using a product and doing the job for themselves (Christensen and Raynor, 2003, p. 102). This new-market disruption occurs when existing products have a limited number of potential consumers or force consumption to take place under inconvenient circumstances that prevent a larger number of consumers to use the product (Christensen et al 2004). The new-market disruption introduces products or services that are relatively simple and affordable, and it increases access of new customers. The new-market disruption also help customers do more easily and effectively what they were already trying to get done instead of forcing them to change behaviour or adopt new priorities (Christensen et al 2004).

In contrast, low-end disruptions are those that target customers at the low-end of the market, who are often happy to purchase a product with less performance, if the cost of the product is at a lower price. This low-end disruption occurs when existing products or services that are overpriced and very good, are made more affordable and more easily available to customers at the bottom of the price pyramid. The potential for a low-end disruption is high if there are a substantial number of customers that are over-served and are at the low-end of the incumbents' original value network (Christensen & Raynor, 2003, p. 45). Typical examples are discount department stores and low-cost airlines.

Mainstream customers, placed somewhat higher on the price pyramid, often see low-end disruptive innovations to be of inferior performance, do not value the new features of low-end disruptive innovations, and see low-end disruptive innovations as cheaper and simpler than mainstream market offerings. But during the course of time, through continuous research and development, the low-end disruptive innovation product improves on its attributes in comparison to mainstream products, and begins to attract high value customers who then begin to appreciate and use the low-end innovation (Govindarajan & Kopalle, 2006a, p. 13).

As illustrated in figure 4, low-end disruption occurs quickly over time when the innovation has good quality performance and it attract consumers quickly in a shorter time frame than usual.

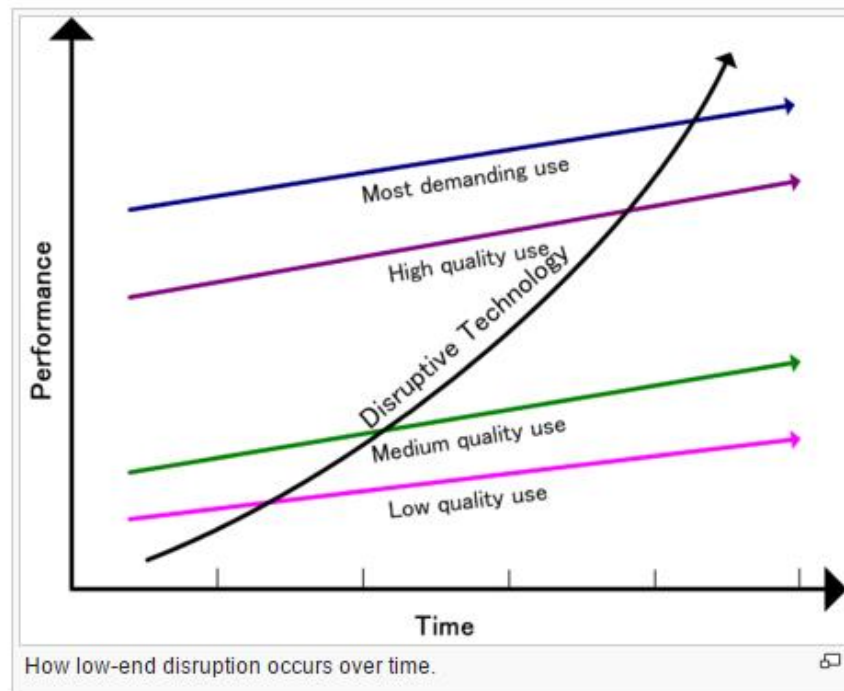


Figure 4. Low-end disruptive innovation performance over time

Businesses engaging in low-end disruptive innovations usually have low gross margins, small target markets, and simple products and services, which may not appear as attractive as existing solutions when compared against traditional performance metrics during initial stages. For mainstream businesses the lower gross margins are unattractive, and as they keep moving upward in the market they are creating space at the bottom of the market for new disruptive competitors to emerge.

C.K. Prahalad argues that low-end disruptive innovation in emerging markets is sematic to the term “frugal innovation”. He states that “frugal innovation” is the process of reducing or removing nonessential features, the complexity and cost of a good and its production, in order to meet the demand of the customers at bottom of the pyramid. He emphasizes that the needs at the bottom of the social and economic pyramid around the developing world are the great unknown and therefore provide numerous product and service innovation opportunities. The disruptive impact is now confined to developing economies but the ripple effect from this surge of disruptive innovation is quickly unleashing to the rest of the world. This has provoked the realization of the value of low-cost, good-enough products, characterized by affordability and sustainability that target the customers at the bottom of the pyramid (Prahalad and Mashelkar, 2010).

### 3.3 Innovation Management: Innovation Process and Innovation Organisation

The reaction from the market to disruptive innovations is somewhat unpredictable, and subject to change. The source of change can be customers, competitors, or legal, social and economic factors. Whilst the reaction to the innovation can be one way at the time of initiation of the innovation, it may change once the new product or service is launched. It is therefore very important for a business to have a thorough understanding of the environment they are working in, in order to be able to assess the reaction of their target market. As research suggests, successful disruptive or frugal innovation requires a deep understanding of the specific environment for which a product or service is developed, proper innovation management, and a clear and suitable strategy.

Therefore, the management of innovations is vital to bring direction to any business engaged in innovation. Given the uncertainty of innovation and the risk involved in it, companies will have to acquire and analyze information in regards to various markets and technological opportunities and focus on the area that corresponds best with their particular strategy, resources, skills and capabilities. For managing innovations successfully, it is important to understand the core elements of innovation management theories. These core elements have been elaborated on and repeatedly refined by academic professionals over many decades.

First, it is important to understand the innovation process as a whole. Developing a new idea and being inventive is only one crucial part of innovation but it is equally important to master the process of turning these inventions into a commercial success (Tidd & Bessant, 2013). Figure 5 shows a simple model of the innovation process.

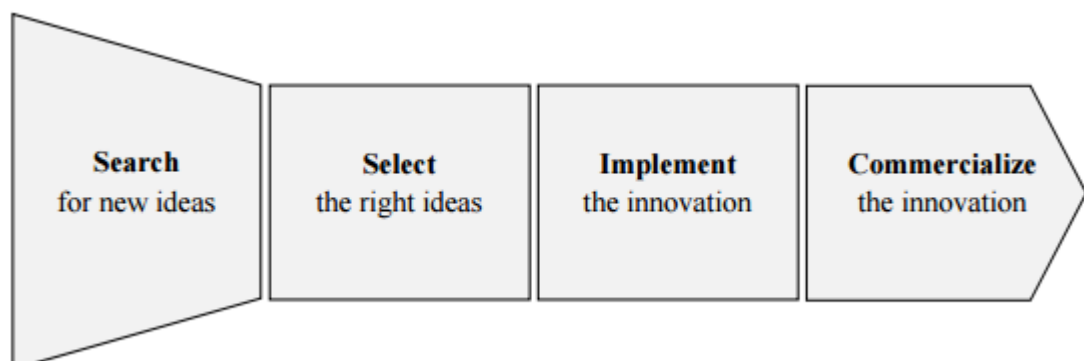


Figure 5. Innovation Process (based on Tidd & Bessant, 2003)

The generation of ideas and inventions does not automatically translate into satisfactory profit or competitive advantage. In order to successfully create a new value for customers, generate financial returns and make a business more competitive, the original idea has to undergo a comprehensive process, which spans from the initiation of the idea to the development and actual implementation of the innovation. Turning an idea into a successful product on the market requires a quality management of the innovation process (Niek and Louw, 2009). Booz (2006) found that a common element among successful innovators is "a rigorous process for managing innovation, including a disciplined, stage by-stage approval process combined with regular measurement of every critical factor, ranging from time and money spent to the success of new products in the market."

Thomas Alva Edison (1847-1931) was one of the most successful innovators of his time, with a high number of registered patents to his name, including for instance the electric light bulb and the phonograph. He was part of setting up the first modern R&D laboratory and built an economic empire of research and development. Although Edison was not known as the inventor of all his innovations, he was accredited by many scholars as great in innovation management processes. He was a great innovator precisely because he understood how to combine the push for new technology by developing inventions and at the same time the market pull of understanding and stimulating demand.

Many companies have a brilliant understanding of the innovation process, but when they start involving external forces and external communities, they are suddenly confronted with very diverse expectations, targets, and working cultures. It can sometimes be too early to engage external involvement, and therefore many businesses rather take the approach of engaging internally with their own staff and transforming their organisations into innovation organisations from within. During this transformation they may establish formal suggestion systems and actively engage the entire organisation with a new management approach, such as for instance total quality management, lean production, and continuous improvement that fosters innovation (Bessant, 2003).

The crucial aspect hereby is not the introduction of methods and tools, but rather the creation of a culture that lets the entire staff feel motivated and remunerates people for submitting ideas, discussing challenges and providing solutions, not only in phases of initial enthusiasm but also in the long run, to achieve an overall high involvement innovation (Tidd & Bessant, 2013). The people within the organisation are the fundamental basis developing innovations and they are the people in the organization who bring the

combination of undocumented knowledge, experience and direct contact relationship to the environment they live in to create novel value. They are in the position to make strategic decisions in the innovation process with regards to technological directions, resource investments, and project prioritization.

In addition to a thorough understanding of the innovation process, as well as the engagement of the entire innovation organisation, businesses need to follow their strategic direction and take into account the environmental complexity they are working within. Figure 6 shows these key elements of innovation management in combination.

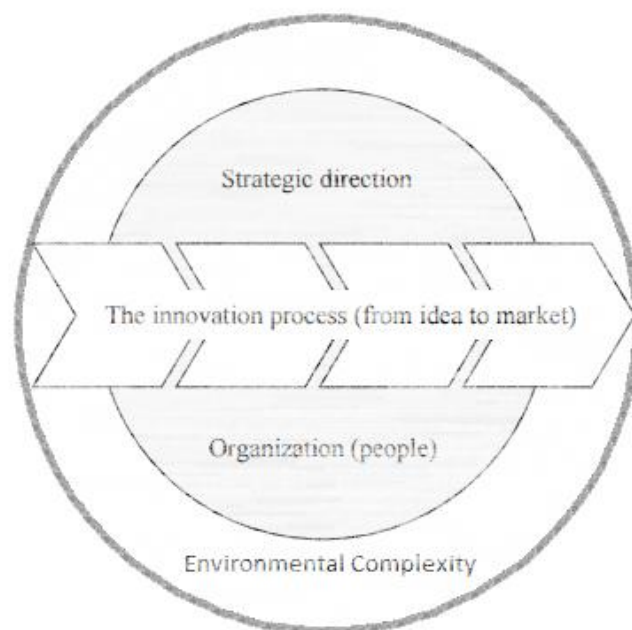


Figure 6. The Innovation management core elements

### 3.4 Innovation Environments - Paradigm Shift in Innovation

The current innovation paradigm understands innovation in terms of economic growth, competitiveness, technological advancement and the market demand for comfort, affordability and relevance. A factor that is not always taken into account and requires more attention is the environment in which an innovation occurs, i.e. the innovation environment or “innovironment”.

Many cities around the world have been identified as having a conducive innovironment, i.e. as being places that foster initiatives and innovation. Some of them are now popularly known as incubators and innovation hubs, such as for instance the Silicon Valley and

the San Francisco Bay Area, which have long been the world leaders in high-tech start-ups, bringing forth cutting-edge companies such as Apple, Intel, Google, WhatsApp, Facebook, and Twitter. In recent years also other cities around the world have risen to become hubs that are generating new start-ups in creative and unique ways. Figure 7 shows the top ranked start-up cities in the world in 2015.

	Ranking	Performance	Funding	Market Reach	Talent	Startup Exp.	Growth Index
Silicon Valley	1	1	1	4	1	1	2.1
New York City	2	2	2	1	9	4	1.8
Los Angeles	3	4	4	2	10	5	1.8
Boston	4	3	3	7	12	7	2.7
Tel Aviv	5	6	5	13	3	6	2.9
London	6	5	10	3	7	13	3.3
Chicago	7	8	12	5	11	14	2.8
Seattle	8	12	11	12	4	3	2.1
Berlin	9	7	8	19	8	8	10
Singapore	10	11	9	9	20	9	1.9
Paris	11	13	13	6	16	15	1.3
Sao Paulo	12	9	7	11	19	19	2.2
Moscow	13	17	15	8	2	20	1.0
Austin	14	16	14	18	5	2	1.9
Bangalore	15	10	6	20	17	12	4.9
Sydney	16	20	16	17	6	10	1.1
Toronto	17	14	18	14	15	18	1.3
Vancouver	18	18	19	15	14	11	1.2
Amsterdam	19	15	20	10	18	16	3.0
Montreal	20	19	17	16	13	17	1.5

Figure 7. Top ranked start-up cities in 2015 (Start-up Cities Report - Compass.co)

Analysts have ranked the world top start-up cities based on their own key performance indexes, but they tend to leave out environments that could be described as negative, unfavourable and harsh, but nevertheless also trigger a lot of innovation, especially disruptive innovation. Disruptive innovations seem to go unnoticed until they gain massive traction from the market, and therefore many potentially innovative environments may not be considered as valuable by businesses for the time being. It is easy to see the comfortable, affluent Silicon Valley area as a prime example for an environment conducive to innovation, while it may be much harder to see a city in a developing country as equally conducive. Yet innovation in the emerging markets does occur and has the potential to make a large impact if managed by competent leaders with a sound strategy. Businesses within emerging markets find ways to innovate without the benefit of govern-



ment support, access to highly skilled labour or ready availability of financing. This phenomenon suggests that the rules of innovation may be changing and there may be new environments for competitors and investors to consider.

To describe these often forgotten, somewhat different conducive environments, the term “disruptive innovenvironment” is very fitting. The term is internally used by Nokia Oyj to point to newly emerging, interesting markets, and it describes the stimulating socio-economic factor in the environment that drives a need for disruptive innovations, which develop products and services that take root initially in simple applications at the bottom of a market and then relentlessly move up the market, eventually displacing established key products that were historically expensive, complicated and inaccessible and replacing them with products that are accessible, often affordable, uncomplicated and available to a much larger population. This transformation is normally made possible through the utilization of appropriate technologies, knowledge collaboration and technology transfer and it generates a culture for creativity and entrepreneurial innovation activities.

Emerging markets are often characterized by pervasive scarcity on many fronts, an underdeveloped infrastructure, ineffective governments and a lack of access to basic services. Technology, globalisation and interconnectivity amplifies the sense of exclusion that prevails in many of these environments, but at the same time offers interesting ways to reduce it. Consumers in these markets are very value conscious, as they often have limited financial resources, but many have recently shifted from being non-consumers to being consumers due to the introduction of disruptive innovations (Christensen 1997). The middle class is a rapidly growing segment of the population in emerging markets, whose members live on \$2 to \$13 per day (as of 2005) (Prahalad 2010). Many analysts project there will be a quadruple increase in the number of Chinese households whose income exceeds from around 55 million in 2008 to 212 million in 2013, with an average income of about \$5,000 per annum. In India, 5 percent of households are predicted to earn around \$4,000 per annum by 2020 (Williamson and Zeng 2009). The predictions are very similar in other countries in the emerging markets. The rise of these new consumer households is the driving force behind new disruptive innovations. Consumers like this are the ones that are typically craving for products that were historically expensive, complicated and inaccessible, and are willing to purchase similar products that are accessible, affordable, uncomplicated and easily available.

Also consumers in Western markets are becoming more value-oriented, and are evaluating their options, especially in times of economic crisis and global recession. According to Lee, Rabanal, and Sandri (2010), the United States personal consumption expenditure has dropped by more than three percentage points during the recession and many consumers began to weigh in on alternative products that are innovative and disruptive. A typical example is the rise the use of the mobile application called WhatsApp. This application simply makes it easier for users to text and call within the application network around the world at almost no cost, provided the user has internet connection. Consumers began to utilize this application because it is cheaper and more economical in comparison to traditional SMS and calling. This goes to prove that aside the middle class consumers in the emerging markets, western consumers have also began to look for simpler possibilities that offer the greatest value (Flatters and Willmott 2009).

Typically, the business models of global companies operating in emerging countries have not paid much attention to the resource-constrained consumer, but have rather had a one-fit-all global business model that tends to focus on the affluent few at the top of the population pyramid who possess the buying power to afford Western products in the context of an emerging market (Arnold and Quelch 1998; Prahalad and Lieberthal 1998). In the context of understanding markets in developing countries as “disruptive innovo-ments”, a shift in the focus of businesses and their products or services has become necessary and entails a lot of potential for future investments. It is amazing to note that very successful new products or services often stem from local innovators, who are low-tech street corner entrepreneurs and create to meet the needs of the local community directly, and by so doing gradually end up disrupting the market with their innovations.

#### **4 Case Study: Africa’s Disruptive Innovironment**

This chapter explains why Nokia initiated this study, why Africa was selected as the target market, why Nokia internally refers to Africa as a disruptive innovo-ment, and how businesses can plan strategically to remain competitive in Africa. The chapter also discusses the current business trends in Africa, the impact of technology on the African economy and what is triggering disruptive innovation in Africa. The chapter highlights research on key elements that are triggers of disruptive innovation in Africa and inter-views key influencers in the region, as well as gathers facts and information about the

disruptive trends for the future. Finally, the chapter makes recommendations to businesses regarding their future involvement in Africa, and selects interconnectivity as the critical element for the disruptive innovation that takes place on the continent.

#### 4.1 What necessitated this study?

Nokia always viewed Africa as a continent that is more dependent on mobile technology than the Western world, and acknowledged that the utilization of mobile technology in Africa was more developed and extensive than in the West, regardless of gaps in infrastructure. Nokia never saw a disruptive environment in Africa nor predicted Africa as a regional source of innovation with disruptive services in the mobile technology industry. But Africa has and continues to become a rapid ICT mobile growth market for devices and value-added services with the fastest market penetration growth globally. The continent is home to several steadily developing economies that have increasingly migrated from no data to data-enabled phones.

The fast growing middle class has in recent years shown great interest in more functionality to be delivered from a simple mobile device. Many users cried out for a single phone to have multiple SIM cards and also wished for a device that could provide more services and solutions, such as for instance the facilitation of monetary transactions popularly known as “mobile wallet”. As much as many customers made their needs and requests known, Nokia continued to rather consider the opinion of their key mobile operators, who only wanted single SIM devices. Nokia also had to consider the financial partners and regulators, who were not ready for a new dimension to monetary transactions.

Due to the unique challenges in the telephony industry in Africa, tariffs are usually high and the GSM service providers are plagued with numerous problems such as instability in power supply, insecurity of infrastructure that resulted in call drops, and difficulty in network accessibility. Customers are not getting value for their money and a major complaint is their inability to access the network to initiate calls. A customer sometimes has to dial several times before a call goes through to another network provider. Even after dialling several times, a customer may get connected to a wrong number. This situation has led to customers having multiple phones with different network providers, so that they could make at least one of them work according to where they are at.

Although the mainstream companies, like Nokia, did not react to the users' inconvenience of having to carry multiple devices and their wish for a singular device, the Chinese phone manufacturing companies picked up on the trend and introduced the dual sim mobile phone. This was a clear disruption in the market and the dual sim phone became a major success on the African mobile phone market. From the onset, production of the dual sim mobile devices looked bulky and unattractive, but since it met the purpose, many users began to purchase such devices. The dual sim device at first only had one transceiver, but with time the device component manufacturers invented multi-transceiver that can keep both sim cards activated simultaneously. This caught the attention of big known brands, such as Nokia, Samsung, Sony Ericson and LG, and they began developing dual sim phones as well. This development is directly related to the phenomenal growth of multi sim devices globally, which can be seen across other emerging markets such as the Middle East, Asia and South America.

Again, the increasing need for less expensive services than conventional banking and new kinds of money transfer options, triggered innovation within the use of mobile devices. Mobile banking services have existed on the Philippines since 2001 but had never gained any traction globally (Alampay & Bala, 2010). Nokia did not venture fully into such services until the launch of M-Pesa in Kenya in 2007, which has by far been the most successful service of this kind, with 20 million customers as of April 2011 (Safaricom, 2011). Mobile money services are spreading across the developing world, and Nokia soon began to see the potential in these services.

This study was initiated in 2011 in order to take a closer look at the developments in Africa. The author was part of the Nokia innovation core team while working as a full-time employee for Nokia in the company's head office in Finland. The team was made up of several Nokia employees based in various offices around the world, and the team's main objective was to follow trends and report on emerging developments. The author was transferred to Nokia's office in Nigeria in 2013, to head the Open Innovation Team for Nokia Research in West Africa. This thesis is the outcome of several years of observing the African mobile technology market and its disruptive innovations.

## 4.2 The African Market - A Rapidly Growing Economy

Africa was ranked the second most-favored region in the world (KPMG 2015, p. 8), with many economists and business leaders expressing the view that conditions are constantly improving. The optimism of investors has reflected in growing foreign direct investment (FDI) figures for sub-Saharan Africa, which have risen by an average of 19.5% per year since 2007 (African Development Bank Group 2015, p.22). Ghana, Kenya, Mozambique, Nigeria, South Africa, Tanzania, Uganda and Zambia are all among the leading destinations according to the African Development Bank's development effectiveness review report (African Development Bank Group 2015, p. 22). Figure 8 illustrates the key factors that make the continent a favored region in the world.

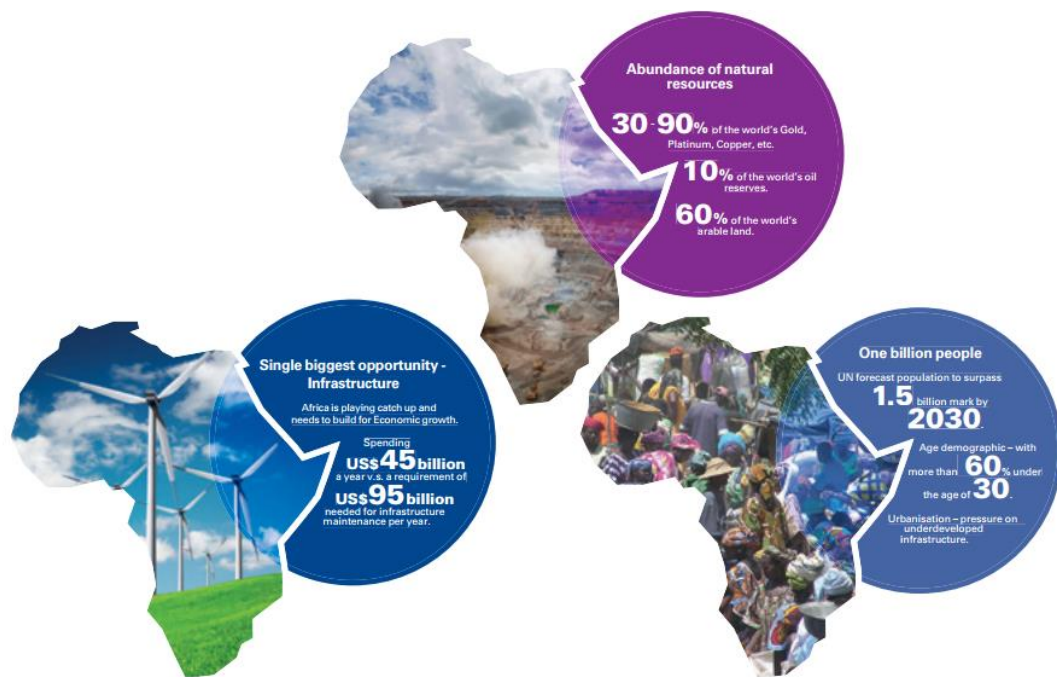


Figure 8. Africa - second-most-favored region of the world (KPMG 2015, p. 8)

The African continent is also experiencing rising GDPs and increasing productivity, and it currently witnesses strong international investment from countries like China and Russia. China is spending one-third of its outward investment of \$100 billion in Africa and the Middle East. GDP per household across the African continent has more than doubled in the last 15 years. Investment increased six fold between 2000/09 and it is now around

85 million households earn at least US\$5,000 a year, the income point at which packaged goods become affordable. By 2015/16 it is estimated that individuals earning more than 1,300 euros or 1,000 British pound will grow by 16%. (Ernst and Young 2011, p. 4). Figure 9 gives further interesting statistics on Africa's demographic and economic situation, and makes predictions on the future based on current developments.

Africa today	Africa tomorrow
Total population: 1 billion	Total population, 1.4 billion by mid-2025
Population under 15: 41%	Total population, 2.1 billion by mid-2050
Adult literacy: 62%	28 million households with discretionary income by 2020
GDP per capita: 10th of world average	Consumer spending will be US\$1.4t by 2020
Around 45% living on US\$1 a day	Collective GDP will be US\$2.6t by 2020
Mobile phone subscribers: 37%	Around 50% of Africans will be living in cities by 2030
Population living in urban areas: 38%	
Collective GDP (2008): US\$1.6t	
Collective FDI (2008): US\$87b	
Combined consumer spending (2008): US\$860b	

Figure 9. Comparative Predictive Table for the future Africa (based on Ernst and Young 2011, p. 4)

The statistics clearly show that Africa is growing, especially since the continent hosts the world's youngest population and a growing middle class. The African population will attract further investment from large international companies, as many begin to see the need to approach this fast-growing and large consumer market with considerable growth opportunities in many industry sectors for exports, such as aerospace, agricultural products, telecommunications, pharmaceuticals and consumer goods.

#### 4.3 Current Technology Trends in Africa

Technology has become an imperative tool for economic and business growth and it has transformed many advanced economies in developed nations. Many developing nations follow in the footsteps of the advanced economies and have come to recognize the importance of information technology in their own development. Although the introduction of ICT on the African continent may be late, this delay also has a positive side to it, as it translates into a competitive advantage: African economies have the opportunity to learn

from the experience of the developed countries and rapidly adopt the most successful technologies. Africa therefore has leapfrogged in the technology space, and is currently in a positive position where it is not bound by legacy technology or restricted by heavy investment in existing technologies. The continent has been able to learn from other countries, cherry-pick the best of the emerging technologies and become a quick global implementer of evolving technologies which a rapid adaptation rate to new innovations and technology changes. This is a great benefit to Africa and other emerging markets as the market does not need to incur the cost of learning and experimentation, which is typically the case for the adoption of new technologies by the early adopters.

When looking at the current trends in the technological field in the African region, the main trend that stands out is the use of mobile computing devices. With more than 1.1 billion people currently using smartphones and tablets, the use of mobile internet is rapidly increasing. As many of these users have internet-enabled mobile computing devices that have installed apps for almost any task, they are often utilizing mobile internet for a lot of their daily routines. In a remarkably short time, mobile internet capability has become a feature in the lives of millions of people, who have developed a stronger attachment to their smartphones and tablets than to any other previous computer technology. Four out of five internet users in sub-Saharan Africa go online using mobile phones, according to TNS, a market research firm. Mobile connections in Africa are projected to grow at an annual rate of 21% between 2012 and 2016. The government of Rwanda hopes to establish its country as a regional information- and communications-technology hub by 2020 and has embarked on building a fibre-optic network and an advanced data center (The Boston Consulting Group 2012). It is clear that the mobile device and mobile connectivity has become a part of man's daily life.

However, the full potential of the mobile internet is yet to be realized, especially in Africa, where only one in three Africans is currently subscribed to a mobile service. The total number of unique individual mobile subscribers in Africa stood at 356 million in the end of 2012, representing just 33 percent of the continent's population. The one-in-three figure is about half of Africa's penetration rate when calculated by connections, reflecting the fact that cost-conscious African consumers hold two sim subscriptions each on average. Africa's subscriber penetration rate is the lowest in the world. The western African region contains 103 million unique subscribers, just under half of these residing in Africa's single largest market, Nigeria. Second is the northern Africa region (101 million), which contains large markets such as Egypt, Algeria, and Morocco. Next follows Eastern

Africa (82 million), Southern Africa (37 million) and Middle Africa (33 million). In total, Africa connections are currently growing by about 15 percent a year, with year-on-year growth strongest in Middle Africa (23 percent), Eastern Africa (18 percent) and Western Africa (18 percent). (GSMA Intelligence 2012, p. 1-2).

Also, studies have shown that there are about 4.5 billion people who live within areas covered by 2G or 3G mobile access, but who are not currently connected to the internet (Deloitte and Facebook 2014). The existing mobile broadband could seem to be a great avenue to get many under-served customers online, especially in the context of current falling prices of mobile devices. Research work done by C. Rossotto, K. Kimura and C. Qiang on the economic impacts of broadband has shown that each additional 10 percentage points of internet penetration adds 1.2 percentage points to per capita GDP growth in emerging markets, and each additional 10 percentage points of broadband penetration that helps in improving the well-being, intellect and earning ability which reflects an addition of 1.38 percentage points of per capita GDP growth. (The World Bank 2009, p. 45)

Although Africa has seen a more than proportional share of growth in broadband connectivity, there are still some challenges that are holding back Africa's full integration into the digital age. For example, there are inadequate terrestrial backhaul links, which limit the full utilization of the growing submarine cable infrastructure. Submarine cables cannot be accessed by landlocked countries, as the connections from coastal countries are missing. Establishing global partnerships with other global carriers is a critically needed step for footprint expansion.

Low average revenue per user (ARPU) figures normally discourage investment by mobile operators, but in the emerging markets operators may invest despite a low ARPU figure. This is because an investment here, in an area that still lacks infrastructure, allows operators to adopt and implement versatile technologies without having to support legacy infrastructures that suit the markets' current situation and projected requirements. Having a versatile technology could fuel significant transformation and disruption, not least from its potential to bring two billion to three billion more people into the connected world, mostly from developing economies.

It is very clear that mobile devices are significant communication tools in the African region. A very good example that perfectly illustrates mobile significance are the 2011



uprisings across Northern Africa, where mobile devices played a big role in transforming ordinary citizens, who were disenchanting by their governments, into resistance fighters. They used their mobile devices to communicate with each other, organize meetings and strategize in real time. Although some governments have tried to slow down this disruption, the revolution kept growing stronger and brought about another era of democracy to the North of Africa. Similarly, citizens in Kenya used mobile devices during recent elections in Kenya. They reported violent occurrences via text messages to a server hosted by the Ushaidi, a crowdsourcing information platform company, which was viewable by the rest of the world. Across the African continent mobile phones are bringing unprecedented levels of openness and transparency to the electoral process, empowering citizens from Cairo to Khartoum to Dakar to Lagos. It is important to note that the key ingredient to making the simple sms application become revolutionary is the access to mobile internet. The transformation begins when mobile internet is accessible and affordable to the greater masses.

In addition to the use of mobile devices, the so-called “Internet of Things” has the potential to be cause a disruptive revolution in the African region. Anything that has an embedded entity, be it electronics, software or sensors, is able to collect, exchange data and sometimes analyse data, and has network connectivity, can be classified as “Internet of Things”. Machinery, shipments, infrastructure, and devices are being equipped with networked sensors that enable them to monitor their environment, report their status, receive instructions, and even take action based on the information they receive. The “Internet of Things” can be a tool to assist the African region in the collection and monitoring of demographic data, in decision-making, and in the process optimization of innovations, which will in turn bring advancement and improvement to the population in the region.

Besides mobile internet and the “Internet of Things”, cloud computing is a third trend in the sphere of technology in the African region. Cloud computing has swiftly become a technology that needs to be deeply integrated across all functions and operations, as it enables large amounts of data to be saved and accessed with ease. Data visualization, wireless communications, and cloud infrastructure are extending the power and reach of information. From a business perspective, cloud computing is reshaping industry ecosystems, invigorating product innovation and enabling new business models that leverage new sources of competitive differentiation. From an IT perspective, cloud offers improved access to and utilization of information technology through use of highly efficient

virtualization and management technology, consumer-style user interfaces and ubiquitous connectivity, including via mobile technologies. It has been established that companies going for cloud computing will naturally become more innovative, become more profitable and create jobs if they turn their back on spending significant amount of time and money on maintaining legacy IT equipment such as in-house server systems and IT software suites.

Despite an average of four mobile network operators (MNOs) per country, it is predicted that a market like Africa may also need more mobile virtual network operators (MVNOs), because this is precisely where they excel; MVNO is a mobile telecommunications service provider that does not own the radio spectrum or mobile network infrastructure over which it provides services to end-users customers. (Papasavva, Sophie 2013). But having cloud service for both the MNO and MVNO, it is believed that the industry would then be able to concentrate more time in improving their existing products and developing new products by focusing their resources on online equipment and SaaS services. The move to the cloud is seen in the technology industry as a very efficient direction. Especially in the telecom sector both the MNOs and MVNOs are saving money and time, and also able to improve their business by simply adjusting their products and communications approach to match the expectation of their audiences. Today, some MVNOs have subscriber bases composed of more than 90 percent smartphones making care in the cloud an obvious choice for one very simple reason. The cloud reliance is reshaping device needs and the disruptive innovations that are emerging from the mobile industry mainly from the emerging markets are also bringing out a new dimension to this revolution.

The McKinsey Global Institute Disruptive Technologies Report (2013) predicted that the total economic impact of cloud technology could be \$1.7 trillion to \$6.2 trillion annually in 2025. Most of this impact (\$1.2 trillion to \$5.5 trillion) could be in the form of additional surplus generated from cloud delivery of services and applications to internet users, while the rest could result from the use of cloud technology to improve enterprise IT productivity.

#### 4.4 The Impact of Technology in Africa

Emerging markets have to deal with scarcity in so many forms, for instance with a lack of capital, inadequate infrastructure, and low levels of literacy and educational attainment, among others. What is also clear, however, is that they do not have a scarcity in ingenuity and determination to succeed. Businesses and individuals continue to look for new ways and strategies to link advanced technologies to the development of different sectors, such as education, health, agriculture, finance, transport or entertainment, and they have proven to be very disruptive with their innovations. African disruptive innovations with regards to technology are not just mere gadgets but rather life-enhancing tools that aim to directly improve the quality of life of African people and offer new, innovative solutions to the needs of under-served masses.

The following gives an overview on this kind of a disruptive use of technology in differing sectors of the economy, namely agriculture, finance and health. The peculiarities of Africa's needs have encouraged Africa to come up with ingenious ways to solve problems in these sectors.

##### 4.4.1 Agriculture

The agriculture sector is a lifeline to the African economy; it is one of the largest sector employers in the continent. The World Bank's Africa Agribusiness Report (The World Bank 2013) explains that agribusiness and the wider food sector have yet to emerge in Africa, where agricultural production represents over 60% of the entire value chain.

With a rapidly increasing middle class, a majority of the demand for agricultural products will come from growing urban centres and there is an ever-increasing demand for quality food and the infrastructure to support it. Meeting the goals of income growth, increased food security and improved social well-being, remains a major concern of African governments and their regional and international development partners. Various strategies and programmes to improve the present economic and social indicators are being implemented across the continent. Additionally, the urbanization trends make it necessary to increase agricultural productivity and modernize agro-food chains by introducing appropriate innovations. Innovations in this sector are sometimes very much of the disruptive kind, aimed at allowing supply of foodstuffs to the growing number of urban dwellers.

This is achieved by strengthening linkages and generating mutual benefits across the technology and agriculture sectors.

Research done in the agricultural sectors of several African countries has uncovered that the introduction of mobile phones has bridged a huge gap between basic agriculture farming and the infusion of basic technology. Mobile devices and applications have made a huge transformation in the lives of farmers in the continent by serving as platforms for sharing weather information, market prices, and micro-insurance schemes. Mobile phones and farming applications are allowing farmers in the region to make better decisions that eventually translate into higher-earning potentials and reduce losses. For instance, farmers are able to send a text message to find out crop prices in places thousands of kilometres away. An example for this is an application called M-Farm SokoniSMS64, launched by telecom operator Safaricom, which is a text-messaging platform that provides pricing information to farmers. The application was created in partnership with Kenya's Agricultural Commodities Exchange. After the successful launch, other operators and mobile application developers in the region also initiated similar services for both people involved in animal farming and in crop farming.

#### 4.4.2 Finance

Another sector that has been greatly influenced by disruptive technological innovation is the sector of finance. Basic banking services have been introduced to under-served customers at the bottom of the pyramid with the introduction of what is known as “mobile money”. As earlier stated in the study, mobile banking services already existed in the Philippines, but had not gained much traction globally. When mobile money was launched in Africa in 2007, Africa's unique innovenvironment propelled the mobile money disruptive innovation to really transform a key service that was historically expensive, complicated and inaccessible. Banking would never be the same, as the innovation now rendered the service with a simple SMS application that was accessible to everyone, including consumers at the bottom of the pyramid, and it relentlessly moved up into the mainstream market. Disruptive quality was achieved by serving the under-served and making banking services accessible to the masses.

The rapid unpredictable changes in the financial sector began to displace established traditional mainstream banking institutions, as their customers began to see the value and convenience of the mobile banking services rendered to them via their mobile

phones. Consumers could now pay remotely via mobile money, and products can also be switched on and off remotely based on payments received. Many Africans now use mobile money to pay their bills and airtime, buy goods and make payments to individuals, and remittances from relatives living abroad are also largely sent via mobile banking. Mobile phone payment makes life easier for ordinary people, no more mattress banking is needed. This convergence between mobile phone technologies and finance has now offered a very promising future for the low-income market.

The wave of transformation has also made way for the introduction of M-commerce (mobile commerce), which has the potential to stimulate economic growth on all levels in Africa. M-commerce is now on the frontline of disruptive innovation on the road towards the cashless society. The runaway success of M-PESA in Kenya is inspiring similar initiatives across the continent, from South Africa to Nigeria to Tunisia, as governments struggle to extend banking services to large numbers of the population across sub-Saharan Africa, where only one in five adults own bank accounts. It is also important to note that the banking institutions have been receptive to the transformation and this move has encouraged the innovative transformation in the sector.

#### 4.4.3 Health

Disruptive technological innovation has also brought about a transformation in the health sector by introducing “mobile health”. Mobile health continues to be praised for its potential to significantly reduce costs in the African region. As the region is challenged with many health issues but continues to lack the basic health infrastructure, there is an immense need to at least administer health information and knowledge to the under-served majority of the population. While the developed world focuses on reducing the cost of monitoring and treating chronic conditions, mobile health in Africa fulfils a much greater need by spreading much needed basic health care information to rural areas and other out-of-reach communities.

Once again a simple text-messaging solution from a disruptive innovator in Ghana has been utilized to tackle counterfeit medicine in African countries such as Ghana, Kenya and Nigeria. The World Health Organization estimates that nearly 30% of drugs supplied in developing countries are fake. In 2009, nearly 100 Nigerian babies died after they were given teething medicine that contained a solvent usually found in antifreeze. The pioneering innovative idea was to put unique codes within scratch cards on medicine

packaging that buyers can send via SMS to a designated number to find out if the drug is genuine or not. The system is now being used by several countries in Africa and has been rolled out even in Asia, where there are similar problems with counterfeit drugs.

Likewise, a similar service in South Africa allows people to find healthcare providers anywhere in the country 24 hours a day, using their mobile phones. Indeed, the mobile phone is increasingly playing a vital role in mediating the provision of better healthcare to the citizens of African countries. This phenomenon is not just catching on in the African region but also globally, where the mainstream is also realizing that mobiles are highly effective and potentially lucrative for the dissemination of health and lifestyle tips, and a convenient way to disseminate health knowledge to the masses.

There are currently groups of organizations around the world who are advocating the use of mobile technologies to improve health throughout the world. The mHealth Alliance is an example of such a group. The consortium has unveiled a “teleradiology” application, which is a set of technologies that allow radiologists to read medical images. There is also another application known as MedAfrica, which is a virtual library of medical information available on a smart phone. Another innovation is Cardiopad by Himore Medical. Cardiopad is a computer tablet that enables heart examinations like electrocardiograms (ECG) to be conducted at remote, rural locations that has never before been able to offer such crucial diagnostic tests. Cardiopad utilizes electrodes, fitted with Bluetooth, that are placed on the patient’s chest, sending a signal to the touch screen tablet, that can then wirelessly transfer the readings to one of the few cardiologists in the country, who is normally located in the capital city. With very few cardiologist in many African countries, this innovation allows many heart patients to receive medical advice, even when they are unable to travel to an urban centre.

As new and innovative mobile applications emerge, they are drastically changing the way the healthcare industry operates and cause a positive disruption in the sector. Once again there is no better environment than Africa for this to take place, where a great demand and an even greater desire for disruptive innovations meet, all with the objective in mind that the under-served masses survive and benefit from innovations.

#### 4.5 Predictions on Future Trends and How Businesses Are Strategizing

Christensen (2000) stated that “disruptive technologies are typically simpler, cheaper, and more reliable and convenient than established technologies”. Disruptive technologies are the advances that transform lives, business and the African economies. The relentless parade of new technologies is unfolding on many fronts. Almost every advance is billed as a breakthrough, and the list of “next big things” grows ever longer. Not every emerging technology will alter the business or social landscape but some truly do have the potential to disrupt the status quo, alter the way people live and work, and rearrange value pools. It is therefore critical that business and policy leaders understand which technologies will matter to them and prepare accordingly.

Africa as a developing continent is now the new destination for innovation and it emerges as the next big market. But for Africa to fulfill its promise of growing economic prosperity, countries must build innovation environments that support the aspirations of startups and established companies to develop innovative products and bring them to market. Most global companies are committed to helping African governments, businesses, entrepreneurs and universities develop the skills, capabilities and networks that will help them foster innovation and economic expansion. One might wonder why many global companies are trooping into the continent? Companies like Nokia, Microsoft, Apple, Google, IBM, Accenture, Ericsson and Samsung have not been left out and these companies have invested in Africa finding new ways to tap the opportunities in Africa.

The objective of this study is to understand the African market in order to be able to make successful business propositions to a company like Nokia. In the scope of this study, the author and other regional heads of the Nokia Research Center Africa team conducted personal interviews with chosen key actors from various companies working in the African region: IBM, Google, Microsoft, Huawei, Pay-Pal, Intel, Visa, Ericsson, GSMA and Samsung. The questionnaire that was used for interviewing can be found in Appendix 2. The study presents the strategies these companies are taking in regard to the emerging markets and aims to understand the path and direction the companies are intending to take in the future. The interview further questioned the representatives of these companies on how they have started to turn their company strategies into actions and investments, and how they will best capitalize on Africa’s immense growth opportunities and local innovation.

Emerging markets often require business models and strategies that address the whole ecosystem that surrounds their offering. There are a selected few companies that seem to have made a virtue of adapting and catering to the needs of its emerging market. As critical as the new inventions and disruptive technological innovations may be for a business to remain competitive and successful, the business strategy of a company is what makes the great impact. This means considering the whole ecosystem or the environment could make innovation become a hero or a zero for a peculiar dynamic market.

IBM's strategy is aiming for the SMAC stack, i.e. social, mobile, analytics and cloud. IBM intends to fulfil its promise of growing economic prosperity and is committed to helping African governments, businesses, entrepreneurs and universities develop the skills, capabilities and networks that will help them foster innovation and economic expansion. IBM opened a new research lab in Nairobi, Kenya, in November 2013 and expects the lab to start making significant technical and commercial contribution in five years.

By ensuring that there is an expansion of operations and research labs, the innovation process for Africa can be continued and help entrepreneurs in the innovation ecosystem. A specific program with Airtel aims at improving mobile connectivity services in 400,000 towns and villages in Africa. Also, IBM provides the back-end of the world's biggest mobile money service "M-Pesa" for Safaricom/Vodafone in Kenya. Another long term vision will be "big data". It refers to cognitive computing, algorithms that enable finding answers to complex, open ended questions. The main application for Africa will be that with such technology internet can be made accessible for users with low (tech) literacy.

Senior management executives at the company Google, which is currently known as Alphabet, expressed their key interest and focus on the issues of connectivity, cloud and ICT technology as their strategy for Africa. The goal is to bring ICT technology experience that is accessible, relevant and sustainable and helps to make the web relevant to Africans. The company intends to improve internet access and help strengthen a sustainable internet ecosystem, which would in turn enable people to use Google's services easily. Google constantly pushes local governments to invest in infrastructure and to remove regulatory barriers. Probably the most imaginative of the various initiatives in that domain is called 'Project Loon', which is a plan to develop high-speed wireless networks in sub-Saharan Africa with the help of high-altitude balloons that can transmit signals across hundreds of square kilometers.



Another focus area is pushing Google's own products. They have partnered with local operators to provide free email accounts to all subscribers. Also Google is partnering with universities to provide access to their web-based office applications for students. Also they are running a number of initiatives around helping local content providers to upload content to YouTube. Google has also initiatives with local pilots related to electronic commerce and services. One of them is Bepa Pay. It is an electronic transport payment solution in partnership with Kenyan Equity Bank. It is built around Near Field Communication technology (NFC). The Bepa Pay app turns an NFC enabled Android phone into a transport card reader commuter's use. Another one is called Woza Online – an initiative to enable small enterprises in South Africa to create ecommerce websites for themselves.

The regional African heads of the Nokia Research Center also interviewed executives from the Microsoft 4Afrika Initiative, which is a sub organization mandated by Microsoft to actively engage in Africa's economic development to improve the company's global competitiveness. The interviews revealed that the Microsoft 4Afrika initiative aims to increase internet accessibility via affordable smart devices, educate the next generation of African web developers and promote new Africa-centered technologies. In collaboration with Huawei, Microsoft introduced a Windows Phone called Huawei 4Afrika with features and applications specifically designed for the African market. The initiative represents a new strategy in which social and business ventures work synergistically rather than independently. The 4Afrika initiative launched in February 2013, and is an effort that has the company spending an additional \$75 million over the next three years over what it is currently investing in Africa. The initiative includes working with the Kenyan government and a Kenyan internet service provider to deliver low-cost, high-speed wireless access; getting millions of smart devices into the hands of African youths; bringing a million small- and medium-sized businesses online; providing skills training; and creating an "online hub" through which small- and medium-sized businesses can gain access to free products and services from Microsoft and others.

Intel, a working partner of Microsoft, launched its first Intel-based smartphone in Africa, the Yolo, in early 2013, and the company is also working to expand the software development community by investing in mobile apps development and university training.

The Huawei leadership explained during interviews, that the company has 6000 employees across 18 offices in Africa and currently have an R&D facility in South Africa and

Nigeria. The focus of R&D centres is to provide market insights and new service and software innovations that address the local needs. Globally Huawei spends 10 per cent of its revenue on R&D. Huawei's competitive advantage is relative affordability combined with high service levels, local presence, and close relations to corporate customers. Huawei creates solutions that enable customers to reduce power consumption, carbon emissions and costs, thus contributing to the development of the society, economy, and the environment across Africa. Huawei actively promotes its GSM base stations as among the most eco-friendly in the business, claiming that it cuts energy usage by 47% compared to regular towers. As an example of their initiatives in Africa, Huawei has helped 18 African governments build e-government networks, enabling 250 million Africans in rural areas enjoy affordable communication services.

The interviews also uncovered that back in 2008, Ericsson was planning to open several R&D centers in Africa (e.g. in Ghana and Kenya), but needed to withdraw due to major organization overhaul. However, they have a broad network of sales, delivery, and training facilities in Africa. Furthermore, Ericsson Labs, an arm of global Ericsson research, worked on concepts that are relevant for developing markets. Ericsson's vision is to bring scale and trust into mobile money transactions and create a modern financial ecosystem by connecting banks, financial institutions, and internet service providers. Ericsson's M-Commerce product portfolio contains Wallet, Converged Wallet, and M-Commerce Interconnect. These are solutions that enable operators to offer m-commerce services to their customers. According to one senior executive in Ericsson, the effect of introducing mobile money can increase the average revenue per user (ARPU) by more than 10 per cent – in developing markets. Recently MTN Rwanda has deployed Ericsson's Converged Wallet solution. Core idea is to use existing assets: current mobile phones and operator infrastructure. Ericsson has also a research stream on security. However, Ericsson's focus is more on data security and privacy than personal and physical security.

GSMA Company is a trade group that represents network operators that use GSM technology for their networks and the company has a global initiative established to support mobile operators in understanding and unlocking the potential of electronic and mobile identity known as the GSMA Mobile Identity programme. GSMA provides best practices and recommendations for governments and operators and plans to pilot a solution in the coming years.

As some of these known brands are establishing research labs in the continent, others are partnering and collaborating with local players to understand the environment. PayPal has partnered with Equity Bank Kenya and Ghana, to enable the bank's customers to use PayPal for online purchases without having a credit card. Visa has also partnered with Vodafone, Intel, and Orange to provide Visa services for mobile users in developing markets.

Another global technology giant, Samsung, is focused on customization: built for Africa, by Africa, and in Africa, which is a practical strategy based on extensive research and development to produce technology innovations specific to the African consumers' unique needs, and the unique resources and conditions of the continent. In response to the demands of a growing African middle class, the company has developed the Ecobubble SCOUT, which is a deep-foam washing machine that is 70% energy efficient and saves consumers up to 30% water use. Many of the modern cities in Africa experience periodic power outages. Taking this factor into consideration, Samsung has come out with the Duracool Refrigerator line, which has 'cool packs' allowing refrigerators to remain cool when the power is out. Despite the growing middle class, Africa still has massive rural populations living at our near international poverty levels. Samsung still sees a market among them, and offers solar-powered netbooks and televisions. The company has also launched the inexpensive, entry-level Galaxy smartphone that allows users to benefit from the plethora of truly helpful apps that African entrepreneurs are developing. The company's plan is for its in-country fulfillment model to be established through local partners and distributors, trained and skilled at country level.

During the interviewing process, key influencers in the region were also asked to elaborate on their future predictions in regard to key technology trends and the sectors technology will play an important role in, as well as the impact technology and innovation will have on businesses and the continent as a whole. The author has selected a few transcripts from the interviews to make a supporting argument to the study. These statements go to reaffirm the objective of the study.

Among the interviewees was Mr. Oltac Unsal, who is an expert on and a practitioner of innovative financing methods and advises governments and various groups at the World Bank on innovation, technology and entrepreneurship. At the time of the interview Oltac was the lead of infoDev's global financing programs, a global multi-donor innovation, entrepreneurship, and technology program in the World Bank Group. Mr Oltac Unsal,

commented that “the difference between developing countries and developed countries is that there are many competitors in a developed market, which allows for varieties of choices, but in Africa there are no many varieties to choose from because everyone runs into markets where profit is obvious. An octagonal business model is a model that allows companies to monetize the less obvious. Octagonal models, where something very obvious is taken and used in a way that is not obvious to competitors”.

Many interviewees believed that the next big market is Africa and the combination of innovation and technology will take the continent to the next pedestal. Mr. Oltac Unsal explained that “the peculiarities of Africa’s needs have encouraged Africa to come up with ingenious ways to solve problems and these spreads and becomes a world-wide phenomenon. Such initiatives include the bio-climate research and Kenyan’s mobile payment system”. Africa is already seeing the benefits of the mobile technology industry, both as a driver of economic growth and innovation and this helps to explain the rapidly growing tech services economy in the continent, and its innovation in mobile applications. Africa has proven to be some-what different when it comes to mobile telephony. African technology innovations are not mere gadgets. They are life enhancing tools that contribute to a more productive economy and improvement in quality of African people. Mark Walker, research director at IDC said technology development in Africa is the opposite of conventional markets; where innovation has come to be considered more of an improvement on existing products, and less of a breakthrough. “If you look today you see a glut of capacity on the east of Africa (...) and you see places like Kenya, Tanzania, becoming very, very innovative and using the technology very, very quickly.”

The biggest innovation from Africa is in educational technology. The hardware cost of technology is coming down and internet is also becoming accessible to many. “What I see will happen in a short time is that educational institutions and African technological industries are going to collaborate to produce contents influenced by the rich African heritage to promote the accessibility of education”, said Oltac Unsal. He cited Nokia Mobile Mathematics as an example. Nokia Mobile Mathematics is an innovative educational solution using mobile phones to study mathematics which is already in use in 200 schools in South Africa and being piloted in many other countries and open globally for anybody to use. The solution gives added value to teachers in teaching and learners in learning, and is suitable for both formal and informal learning. Making education accessible, supporting equal opportunity for learning is essential and is at the heart of companies such as Nokia.

There is the urge to encourage organizations and institutions across Africa to consider the unique ways in which they can help provide quality education and skills development to the youth. Tunji Elesho, the head of the Co-creation Hub Pre-incubation and Research (Cchub) in Nigeria stated the following: “Education in Africa is one-way; mobile technology can help students learn on their own. The reality is learning needs to be personalized since there’s a poor teacher to student learning ration in Africa. Mobile service can help narrow educational barriers. Nigeria faces technical infrastructure challenges, and lacks computer literacy.” One of the ways which this has been combated is the incorporation and the implementation of e-reader technologies that provide school children in the country with books via phone-based e-readers, which also offer the advantage of interactivity. We need to understand Human behavior and tailor technology to meet needs in small communities and rural areas.

Most of global tech companies are working on how to enable more people access internet and improving the speed, quality, and affordability of the connection. The rationale is market creation when people have sufficient internet connection they will start buying content and services. Google's Communications and Public Affairs Manager Lena Wagner predicts the future of Google for Africa is to “improve internet access, help make the web relevant to Africans, and help strengthen a sustainable internet ecosystem”. Mrs Omobola Johnson, Minister of Health in Nigeria, indicated that the emerging of mobile broadband enables access to numerous e-government services, such as electronic tax filing, online health care services or e-learning, and increases the level of e-commerce and applications anytime and anywhere while on the move.

Furthermore, the focus has clearly shifted from importing Western solutions to embracing African innovation. Many interviewees believed in the “built for Africa, by Africa, in Africa” idea, which focuses on localizing and integrating solutions, while ensuring local people are skilled. The integration can only be by local partners and distributors, trained and skilled at country level. To make this idea a reality, global technology companies have embarked upon several initiatives: the expansion of their operations within Africa, the building of research labs in Africa, the support of innovations for the African market, skills-development programs in Africa, and help programs for individual entrepreneurs. Many companies’ Africa strategy and projects involve local skill development (e.g. mobile and web developer training), localization of global services for local African needs, tapping into local innovation like various innovation hubs in the continent, and supporting

local businesses to grow. Also there is general consensus that African countries and cultures are very different, and there is rarely a one-size-fits all solution for the whole continent.

#### 4.6 Research Findings and their Implementation with Spectra Wireless Inc.

All research findings and interviews proved that interconnectivity is critical in Africa. One can discern this common denominator across the global corporations' initiatives and strategies for Africa, and it was also reaffirmed by key influencer interviewees. Also, there are some key strategic elements that are common in most global and local technology companies' approaches to working in the African region, which are as follows: accessibility, affordability, relevance and sustainability. Focusing on accessible, affordable, and relevant and sustainable business is the future.

Even people from a financially weak background, or those living in remote villages, now have access to cable and satellite TV and can see what they are missing out on. This ability to see what the world has to offer drives them to aspire for better and more things. The pervasive mobile phone ownership due to lower costs and greater availability of devices creates many new opportunities for inclusion. Business that are among the first initiators have a chance to gain a strong hold in the African market and profit from a high probability to reap lucrative future benefits. It is now very clear that global companies such as Google are looking at hundreds of millions of prospective new customers who will have their first experiences using the web through Google services. Simplicity is key when it comes to designing new products or applications, as many see add-on features as less important. The intuitiveness of the system will be the main driver on the path to creating a more successful product.

While global corporations are presented with a significant growth opportunity, they are also presented with challenges due to unreliability and quality of power supply, high levels of poverty and a lack of basic education, although the mobile industry is playing a role in addressing these issue via mhealth, mlearning, mAgric and other initiatives.

TV White Space was identified as the formidable technology that may address these challenges, and it stands to transform the purchase and use of wireless internet. TV White Space technology has better signal propagation over rugged terrain, through thick

foliage and in urban environments, spans a 10 kilometer radius range, and is very ideal for urban and rural connectivity as illustrated in figure 10.

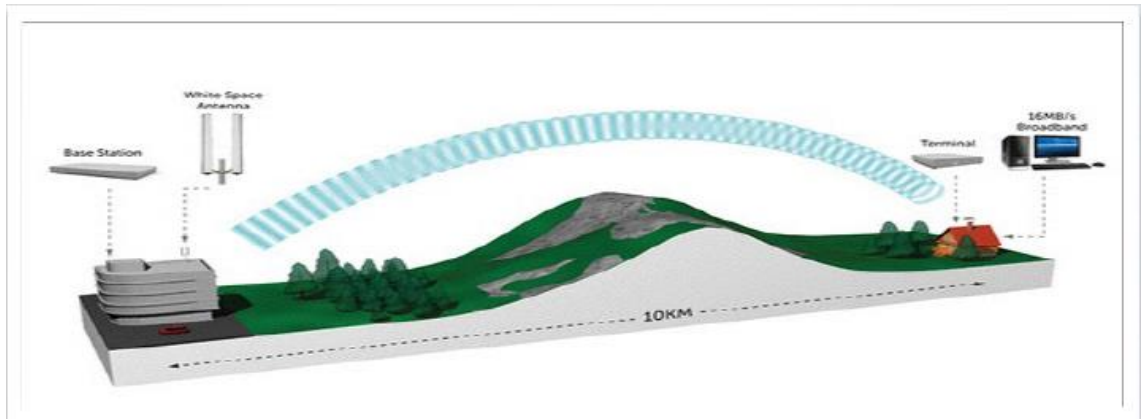


Figure 10. Illustration of the TV White Space technology

White Space is generally defined as the gaps in between broadcast TV channels in radio spectrum, which are usually left empty as buffers to prevent TV signals from bleeding into one another. The spectrum also has the capacity to carry wireless broadband and this offers broadband coverage to heavily populated areas. TV White Space technology operates in the UHF band spectrum (470 MHz - 694 MHz) and has excellent signal propagation and range to allow for simple TV Yagi antenna to link its corporate and non-corporate clients. The strength of the signal also means the service does not experience weather effects such as rain fade and topological constraints as with other radio platforms. TV White Space delivers high-quality web access and is different from other point-to-multipoint, last-mile access technologies because of its ability to leverage the UHF frequencies to trade off range, obstacle penetration and power consumption issues. TV White Space radios are also environmentally friendly, because they emit low transmit power. Government regulators are therefore considering allocating more airwaves for broadband purposes. The technology performance compares with 3G, 4G & LTE and yet CAPEX & OPEX stand below 40% of legacy radio deployments as illustrated in figure 11.

## **TDD-LTE supercharged by ARN\* adaptive radio networks**

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	TDD-LTE (Per 5MHz)	ARN* (Per 5MHz)
Towers	Dedicated structures	Not Dedicated **
Height	15-50+ meters	3 to 20 meters typical **
Antennas	3 sectors for 360 deg	Single Omni or Directional**
Reach	1.5 km (typical)	5+ km (typical)**
Spectrum	Licensed	Unlicensed**
Downlink	10+ mb/s	15+ mb/s
Uplink	500 + kb/s	15+ mb/s**
Network	Network level synchronization	No synchronization needed
RF	High power (5~30 watts)	Low power** ( .1W to 1watt)
Topology	Engineered Line of sight	Self Organizing, non line of sight
Terminals	Handset, Dongle, AP	Indoor/Outdoor AP Handset, Dongle
		** Lower Cost

Figure 11. A competitive advantage table between TDD-LTE and ARN

Before TV White Space was realized to be a lucrative possibility in Africa, the technology was being worked on by Nokia Research together with other global companies. Together with Microsoft, the BBC, and BT, Nokia had launched a consortium to support the TV White Space project and had one of the largest white space technology trials in Cambridge in 2011. Although it is not yet widely adopted, this unlicensed, free form of broadband is gaining ever more traction.

Google and Microsoft have both heavily invested in the TV White Space technology. Knowing very well that with the necessary spectrum allocations and transparent regulation, the mobile industry could also fuel the creation of 14.9 million new jobs in the region between 2014 and 2020, Nokia and Microsoft planned to test White Space technology in Ghana, Kenya and other African countries. Google, on the other hand, also made a



commitment to experiment with the wireless broadband system at schools and universities in South Africa and in Uganda, with the aim to show that White Space internet access works without disturbing TV signals.

As a result of the research done, it became clear that it would be strategically important for Nokia to use Microsoft's patented White Space technology. The decision to take up White Space technology was also based on the fact that the two businesses had already been working on a software-defined radio platform for several years in relation to this technology. Plans were that the companies would roll out a world-wide system that would possibly short-circuit the world's largest carriers. Microsoft and Nokia were expecting to utilize small, Wi-Fi-like access points with a cost of 250 to 500 US Dollars, rather than cell towers that can cost up to 250,000 US Dollars. Upon the delivery of the connectivity technology, Nokia was expecting to be able to deliver affordable, accessible, relevant and sustainable solutions on the cloud to its customer base, such as for example digital identification, predictive maps, cloud-data analysis, data intelligence, and the Nokia wallet. The services that White Space technology was expected to enable are illustrated in figure 12.



Figure 12. Nokia's Value Proposition for TV White Space

Nokia and Microsoft were expected to officially announce the new White Space initiatives in 2013, but during the course of the research for this thesis, Microsoft bought the Nokia mobile device division, and thereby also took over this research project and its implementation. Nokia kept its share of the White Space technology license and patents, and thus continuous to make revenue on the technology.

Microsoft outsourced the implementation of the White Space technology to a partnering company called Spectra Wireless Inc. in 2014. Spectra Wireless Inc. is an application services provider company that offers world-class internet service and a wide range of tailored applications. The author of this thesis joined the implementing partner company in the role of Vice President for Business Development. Appendix 3 presents the management team of Spectra Wireless Inc. and the team members' profiles.

Spectra Wireless' business value proposition is to provide value-added connectivity to its clients, which includes affordable, high-speed and scalable internet service, engaging apps and internet devices. It offers users access to a digital cloud platform, connected devices and applications hosted in the cloud. The products and services are offered under the brand name "djungle", as depicted in figure 13.

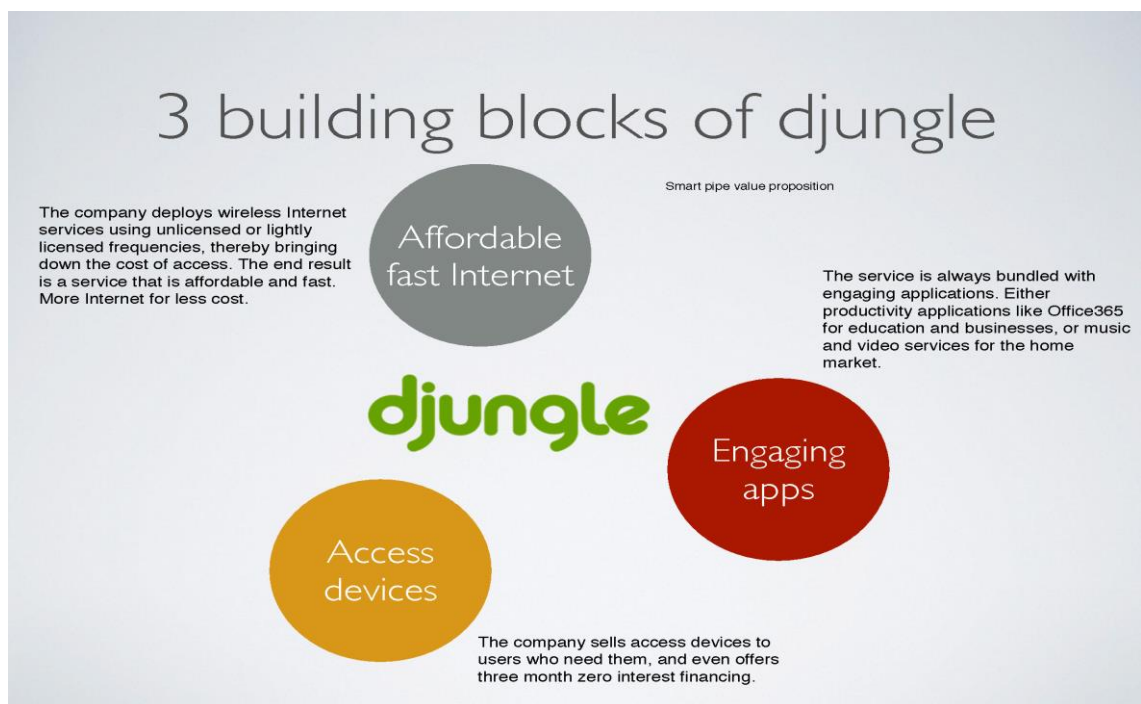


Figure 13. The three key building blocks of Spectra Wireless

Spectra Wireless together with Microsoft announced a joint research initiative with Facebook to launch commercial pilot trials of TV White Space in May 2014. The partnership aimed to provide low-cost wireless connectivity to students and faculties at a polytechnic school in Koforidua, Ghana. Despite the great advances in education, many students in Ghana do not have access to modern learning tools and consider a good education a

luxury. The pilot trials were meant to help improve the education of the students at Koforidua. Spectra Wireless deployed wireless networks covering the entire campus of Koforidua Polytechnic utilizing the TV White Space technology. The network setup followed the conventional wireless platform configurations with base station radios installed in either point-to-point (P2P) or point-to-multipoint (P2MP) mode using Omni, directional or sectorized antenna. This allowed the network to tap from a reliable backhaul feeding a base transceiver station (BTS) which then allows several sites to be served from the BTS as figure 14 illustrates.

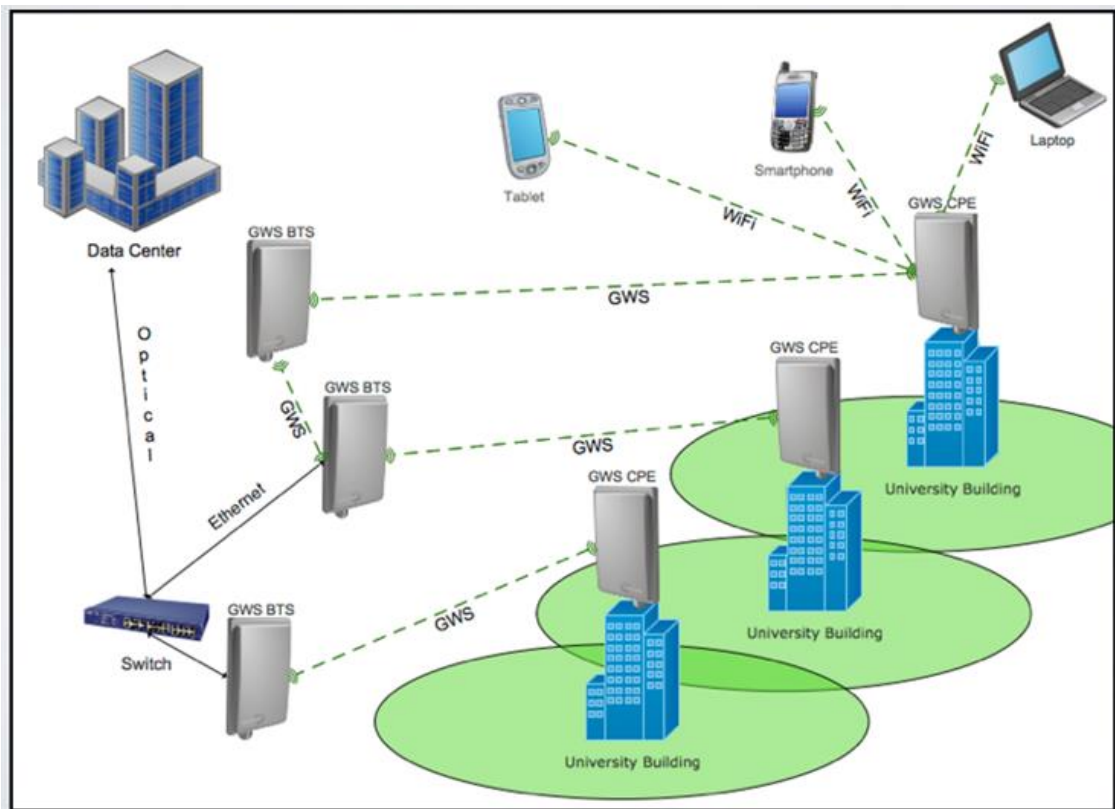


Figure 14. Illustrative TV White Space deployment design for educational institutions

Spectra Wireless addressed the needs of the students and educational institution by offering products and services that provided access to the internet and educational tools needed in a modern learning environment. As well known, provision of internet connectivity without enabled devices is a total business failure. Spectra in partnership with Microsoft, provided a cloud service platform based on MS Azure, offered Wi-Fi enabled devices with zero interest rate financing for a short time, or low interest rates for longer payment periods to enable users to utilize the internet service. In addition, Spectra bundled various Microsoft productivity application services, including Office365, Skype, Lync

Communication, etc. with its standard product, and hereby offered customers more value for their money.

In order for Spectra Wireless to provide accessible, affordable, reliable and sustainable service pack, they definitely needed the right technology. The TV White Space technology essentially harnessed an otherwise fallow spectrum property, which lowered costs but still gave great performance. The company was able to boast of truly offering the service more affordably than the competition, as they only incurred 30% of the cost they would have incurred if they had deployed LTE or any other advanced network connectivity technology. Also, the White Space radios emit low transmit power (20 dBm or 0.1 Watt is typical) and hence consume less power in comparison to legacy radio systems, which makes them more applicable in rural area deployments where energy sources are non-existent or expensive. This therefore allowed Spectra to deploy the network completely off-grid, unlike legacy systems which normally require diesel powered generators as backup power. A solar powered installation on the setup was usual and this made Spectra's system environmentally friendly.

The trials also proved that the frequencies in UHF band span of the electromagnetic waves have higher propagation and range properties. And RF experts testified that it does work very well over rugged terrain and built-up and wooded areas, reducing dead spots in a typical deployment. This definitely made TV White Space a sustainable, game-changing, next-gen technology choice for a nation-wide rollout in Ghana.

After the completion of the successful commercial pilot trials in Ghana and a dozen trials in other locations ranging from remote villages of Africa to the dense urban centres of Asia, and the reassurance of the viability of the technology, Ghana's National Communications Authority granted a commercial license that allows the use of TV frequencies on a secondary basis as long as TV is not interfered with. This officiated Microsoft's partnership project with Spectra Wireless in Ghana, and the companies were able to finally launch Africa's first commercial service network in January 2015.

Spectra has continued to deploy a ubiquitous commercial internet service at the campus of Koforidua Polytechnic, offering affordable and reliable services to up to 8500 users (including students, lecturers and office staff). Students currently enjoy 1 Mbps dedicated and unlimited internet service at only 2 Ghana Cedis per day. This allows students to download and upload up to 10 GB of data within the allowed 24 hour time span. This

beats, by a wide margin, current offerings from Spectra Wireless' competitors in Ghana. Spectra Wireless currently offers the service via prepaid cards. Students can purchase services in a range of transmission speeds and daily, weekly and monthly packages. All packages include unlimited data for the duration of the package. The low-speed packages have been created to cater to users with little disposable cash, while the higher speed products give users the full Internet experience that many in the developed world are used to, as illustrated in figure 15.

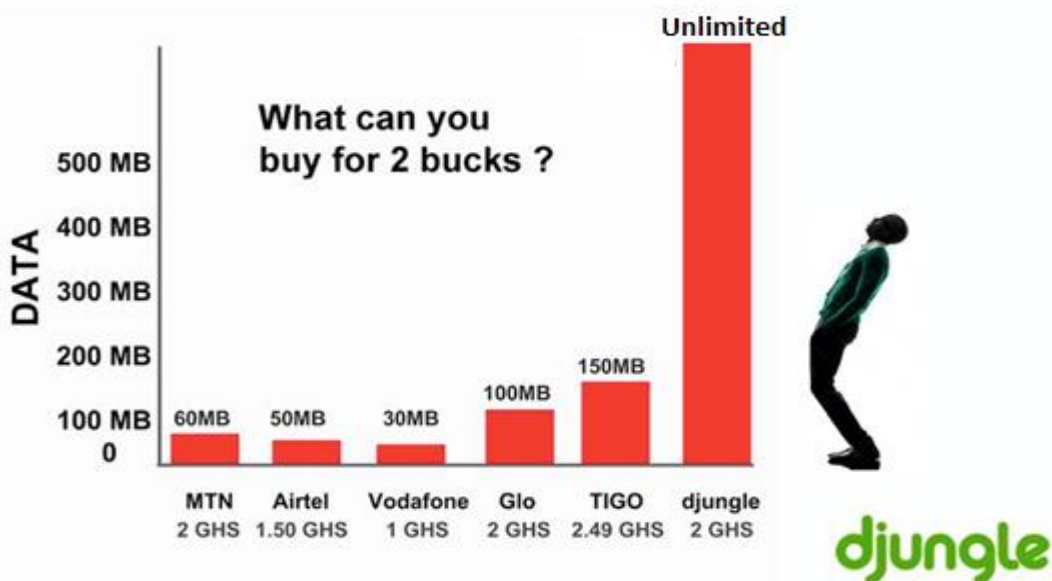


Figure 15. Price comparison on service offerings from local Telecom operators in Ghana

Spectra Wireless has identified education as a key sector for the telecommunication market, which offers opportunities for growth and will greatly benefit from the deployment of high speed broadband services.

## 5 Conclusion and Recommendations

Africa has proven to be a very disruptive environment, an innovenvironment, when it comes to innovation of new products and services. As this thesis shows, there is vivid evidence of innovation in several business sectors, for example in the financial sector with regards to mobile banking. There has been a rapid move from the difficulty of acquiring a simple mobile number, to today's ease of getting 2 to 3 sim cards, and there is a growing number of accessible and affordable devices as compared to the past.

Global businesses have adopted specific strategies to enable them to thrive in the African environment. Although there are risks and challenges that come with working in Africa, companies should not take the approach of waiting for all issues and challenges to be resolved, before venturing into this space. The bottom line is that anticipating future needs and trends in emerging markets requires considerable efforts from a company. The company must carefully observe how people live and behave at the bottom of the pyramid in order to identify the signals in the market. Only a better understanding of the daily lives, environments and needs of their customers can lead a company to effectively design new products and services. Companies thus need to approach emerging markets by developing more user-centred design processes and integrating these into their business models.

Both the research done through interviews and the actual implementation of the research findings in the work of Spectra Wireless Inc. showed that Africa is a disruptive environment, where disruptive innovation transforms key products that were historically expensive, complicated and inaccessible to products that are now accessible, affordable, uncomplicated and available to a much larger population. All interviewees indicated that disruptive innovation has changed and continues to change the dynamics of how global companies are currently strategizing to ensure they remain competitive and innovative globally. The implementation of the project revealed how simple disruptive innovations displace established competitors, in the example of Spectra Wireless' "djungle" service. The study also brought to light the massive impact that the installation of the TV White Space technology has on the mainstream telecommunication operators in Ghana. Although it is just a year down the line since the launch of the White Space initiative by Microsoft and Spectra Wireless Inc., many operators in Ghana are feeling the heat of the innovation and trying with all means to stop this disruptive technology from taking off.

While the initiating partner for this study, Nokia, continues to enjoy revenue through their licensing and royalty business model, the author recommends that management of Nokia and other global companies should take a lesson learnt from the case of Nokia and its significant loss of market share in the African region. Global corporations should re-evaluate their practices of innovation and clearly consider disruptive environments in their strategy planning. Global corporations should also focus on appropriate technologies, and become initiators in technologies that are accessible, affordable, reliable and sustainable rather than just being market followers and remain in the conventional ways of doing things. This is because innovative technologies can make them become market

leaders and give their businesses an unanticipated advantage, especially in emerging markets. Furthermore, it is recommended that Nokia reopens the regional research office, with the purpose of constantly developing and providing direct insight to management on the current trends in the African region. A research office delivers valuable insight into what is next for the target market and ensure that the company remains competitive in their chosen arena of the large-scale telecommunications infrastructure, technology development and licensing business.

Companies that are able to find a business niche in emerging markets can greatly increase their profitability. Quite simply, a niche in a specific emerging market may be a need or response to a dilemma that does not exist in more developed economies. The upside potential can be worth the effort. Finding such a niche gives a company a competitive advantage in the emerging market and requires a thorough understanding of the market, creative approaches and significant research on the growth potential of the market. Also, companies need to build alliances with economic and social stakeholders, focus on disruptive innovation and have the right implementing partners, who will manage the innovation and bring it to fusion, just as Nokia, Microsoft, Facebook and Spectra Wireless have done. The author believes Nokia and other companies have the best chances for success if they focus on advance technology and apply appropriate technology in Africa, such as TV White Space. The goal hereby should be to provide localized services that are accessible, affordable, relevant and sustainable.

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Africa Opportunities

Interview with XXX

### **BEHAVIORS**

1. What are the unserved needs and behaviours the current technology is not able to address in Africa?
2. What new things will people require from their phones, tablets, computers in next 5-10 years? What's going to be different?
3. What kind of local content people in Africa need that global companies haven't been able to deliver?
4. What surprising uses of technology have you observed in African communities?

### **BUSINESS**

1. What are the needs and behaviours and ways of doing business global companies consistently ignore or miss in Africa?
2. What kind of business models are sustainable in Africa? Business to consumer? Business to business?
3. What companies or what kind of companies will flourish in Africa in next 10 years?

### **AFRICA**

1. What makes Africa and developed markets different in terms of use of technology, user needs, and ICT business?
2. What characteristics could help a technology to be identified uniquely as African?
3. How is Africa going to be different from 10 years now? Why?

### **INNOVATION**

1. What kinds of innovations Africa can provide?

2. In which areas of innovation Africa shows way globally? Give your favourite examples.
3. Where the innovation comes, where it grows, what's the engine of innovation in Africa?
4. How can innovation/collaboration activities be supported further in the communities?
5. How can Africa be strengthened as a producer/creator of technology?
6. How will innovation help the continent to develop?

#### TRENDS

1. What are the apparent technology trends in Africa? And the hidden ones?
2. User/consumer trends related to technology?
3. What are the most significant macro-economic and social developments in Africa that will mould the tech industry in the coming years?

#### FINALLY

1. Who would you recommend us to interview for this study?



### **Appendix 3- Spectra Wireless – Profile of Management Team**

Mr. John Sarpong: Mr. Sarpong became the President and Chief Executive Officer of the Company upon its incorporation in May 2013. He is an experienced executive, engineer, and entrepreneur with a successful track record of building several businesses. From 1997 to the present, his principal occupation has been as a senior consulting aerospace engineer with Southline Engineering which he founded in 1997, that is an aircraft engineering consulting firm serving the air transport, corporate and special mission military aircraft industries. Southline Industries has completed projects for Gulfstream Aerospace, Raytheon Corporation (two projects for the Korean Air Force, and the Japan Maritime Safety Agency), and Sikorsky Helicopter (projects for the Turkish Navy and U.S. Army Blackhawks). Mr. Sarpong is also a Senior Partner of Prempeh Capital Partners, an Africa-focused investment advisory and deal origination firm.

From 1985 to 1995, Mr. Sarpong worked for the Boeing Company, where he distinguished himself by being inducted into Boeing's prestigious EXPO program for executives. As Boeing's Market Analyst for the Asia/Pacific region, he was responsible for developing sales and marketing strategies leading to sales of aircraft to more than 40 airlines. From 1995 to 1997, he served as the CEO of Atlanta-based Africa Express Airlines. In 2000, Mr. Sarpong founded Africast Global Media, a full-service e-commerce and Internet portal offering money remittance services to Africa, and educational, entertainment and daily news programming from Africa in streaming video and audio media. Africast secured Internet protocol streaming rights with 40 television channels from 25 African countries. He created the non-profit Africast Foundation to outfit Schoolweb computer labs for rural schools in Africa. He is a member of the United Nations ICT Task Force. Mr. Sarpong brings seasoned management, technical and marketing skills to the Company, as well as, a strong contact base throughout Africa and the U.S. to help build the Company's business. He is a native of Ghana, and graduated from Yale University with a BS degree in Electrical Engineering in 1985.

Mr. Sean Sealy: Mr. Sealy became the Vice President of Operations of the Company on January 1, 2014, and was a consultant of Spectra Wireless, Inc., a predecessor of the Company from January 2012 to December 2013. From August 2011 to December 2011, he was chief technology officer for Dish Broadband Africa, Ltd. Mr. Sealy was the Managing Director of E-MOMS Aps from July 2010 to August 2012. From August 2007 to

June 2010, he was the Director of Product Development for Via One Networks. From April 2005 to July 2007, Mr. Sealy was the Executive Vice President of Switch Mobile LLC, a technology and development company. From July 2007 to the present, he has been the owner and managing director of GD Store Danske, Aps, and a technology consulting firm. He is a graduate of Copenhagen Business School with a B.Sc. degree in Business Administration and Philosophy.

Mr. Moses Acquah: Mr. Moses Acquah joined Spectra Wireless in October 2014 as the Head of Business Development and Sales and assumed the role of Vice President for Sales and Marketing in January 2015. Moses has reputable years of professional experience in the tech industry and was the Ghana Market Manager for Microsoft Devices (Nokia) prior to joining Spectra Wireless Inc. Moses is very analytical and solution-oriented, and has great entrepreneurial and business spirit. He moved up the ranks in Nokia Finland with distinction from 2008 to 2013. Moses began his career at Nokia as a Software Quality Engineer, then became a Software Project Manager (Scrum Master) and eventually took the role of Business and Financial Application Specialist. A versatile and agile individual, who has worked with different international organizations in North America, Asia, Europe and Africa, he was appointed as Innovation Manager to set up the Nokia Research Center in West Africa in 2013.

From 2007 to the present, he has been the owner and Technology Director for Acme Consultancy, a business technology consulting firm in Finland. He is the founder of the Finland Ghana Chamber of Commerce and is an executive board member of the chamber. Of Ghanaian decent, he is a graduate of the University of Ghana with a B.A. degree in Information Studies and Psychology. He also holds two Master Degrees in Software Engineering and Industrial Management from Metropolia University of Applied Sciences, Finland. He currently pursues a Master of Business Administration degree in Business Informatics.

Hezekiah Adesola (Sola) Oyinlola, Director: Mr. Oyinlola is Chairman, Africa of Schlumberger Limited, the world's leading oilfield services firm. He also serves as Global Head of Sustainability for Schlumberger. Prior to 2011, he was Vice President and Group Treasurer for Schlumberger, and served as Vice President for several operating units, including Nigeria and West Africa, Malaysia, Brunei and Philippines, and in senior management positions in Europe and the US over the past 28 years. He has been on the

Board of Trustees of the Schlumberger Foundation since October 2006, and from July 2011 became Vice Chairman of the Board and President of the non-profit Foundation. He earned an MBA from Stanford University in 1984 and a B.Sc. degree in Accounting from the University of Ghana, Legon in 1979. Mr. Oyinlola has also attended the Oxford University Energy Seminar in 2002, and strategic management programs at IMD, Lausanne Switzerland.

Dapo Oshinusi, Director: Mr. Oshinusi is the founder and CEO of Mansfield Energy, a leading provider of oilfield services in West and South Africa. Prior to setting up Mansfield Energy he was President of Reslink for Africa. Dapo was Chairman of the Society of Petroleum Engineers (SPE), Lagos section. He sits on the board of Main One Cable Company. He graduated with honors from the University of Ibadan and holds an MBA from the University of Science and Technology Port Harcourt, Nigeria with several executive development programs in the School of Business Administration, University of Michigan, Ann Arbor, USA, University of Tulsa, USA and Heriot-Watt University, Scotland.