Success factors for innovation and new product development in Africa

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Abstract

A region often overlooked by the global business community, Africa is beginning to command the attention of business executives as well as scholars as an investment destination. Multinational corporations are increasingly committing to and positioning themselves to exploit the commercial opportunity that exists within the continent. One of the ways they are doing so is by developing products for the African consumer. Similarly, local corporations are developing incremental and radical innovations that are designed for the bulging bottom of the pyramid, mushrooming middle class and established elite.

This paper identifies the main factors necessary for commercial viability of innovations in the African market. The most critical factor necessary for a new product to succeed is product superiority. Shining examples on this are Kenya's M-PESA and Senator Lager, Nigeria's Bus Rapid Transit scheme and South Africa's Kreepy Krauly.

Further to this, the paper establishes that South Africa leads the continent in terms of innovation investment and output as well as in intellectual property rights legislation. In Kenya, the paper explores the problem of counterfeit goods and the implications of the illegal trade.

Introduction

A continent long bedeviled by enormous challenges including conflict, disease and deep poverty, Africa is beginning to show signs of progress. Africa's collective gross domestic product (GDP), at $1.6 trillion in 2008, is now roughly equal to Brazil's or Russia's, and the continent is among the world's most rapidly growing economic regions (Leke et al, 2010). With the high rates of economic growth and the inevitable creation of wealth, Africa's population of 999 million (Population reference Bureau, 2009) presents an immense pool of potential consumers. While discount the overselling about Africa's newly-found praise, the commercial opportunity in Africa is too significant to be ignored. Africa is indeed the next frontier to be explored.

As the world's attention has increasingly focused on emerging markets, Africa has not been left behind. Corporations that had previously concentrated on other parts of the world are now setting up base in Africa. Walmart, the world's largest retailer and as of 2010, the world's largest public company by revenue, is setting up base in Africa. According to the Financial Times (2011), it intends to do so through the $2.4 billion acquisition of Massmart, a South African retailer that is present in 13 countries across the continent and with plans to venture into Angola, Senegal, Cameroon and the Democratic Republic of Congo. Walmart is by no means the exception. Bharti Airtel's acquisition of Zain's African assets valued at $9 billion is another recent example of a global giant that seeks to take advantage of the growth within the continent. They join a list of multinational corporations that have realized the opportunities that exist in Africa beyond resource extraction.

In order to fully exploit the continent's potential global brands are being forced to stretch beyond the products and services that have been successful in more developed economies. Africa's unique landscape calls for innovations that are tailored to its needs. Africa has a bulging bottom of the pyramid, a mushrooming middle class and established elite. All three segments have distinctive needs that marketers on the continent must be aware of. Given the diversity just in terms of socio-economic status, corporations must be able to determine their target consumers and innovate around their unique needs. This will enable them to remain relevant and ultimately gain commercial advantage as a result of these innovations.

Innovation and commercialization

The process of innovation has often been confused with invention and even commercialization. For the purpose of this paper, definitions from the U.S. Congress, Office of Technology Assessment (1995) will be applied where invention refers to the act of devising or fabricating a novel device, process, or service. Invention describes the initial conception of a new product, process, or service, but not the act of putting it to use. Innovation on the other hand encompasses many activities, including scientific, technical, and market research; product, process, or service development; and manufacturing and marketing to the extent they support dissemination and application of the invention. Commercialization is an attempt by a firm to profit from innovation by incorporating new technology into products, processes, and services used or sold in the marketplace.

To better explain the process of innovation, various models have been developed. The three main models that have been developed are linear model, chain link model and systemic model. The dominant and traditional model of innovation is the linear model. In this linear process, the innovation begins with basic scientific research, which provides knowledge to be used in the development of new applications by the productive sector that will result in innovations (Da Silva and Degint, 2006).

This model however has its weaknesses as it fails to adequately represent the dynamic nature of the innovation process. The U.S. Congress, Office of Technology Assessment (1995) lists the various permutations that are not addressed by this model as:

1) Incremental extensions of existing product lines to provide new or enhanced features
2) Development of entirely new products that combine existing technologies in novel ways to serve new market needs
3) Applications of existing products and processes to new market needs and;
4) Use of new technology to serve an existing market need

The chain-link model is the second major model and is an attempt at capturing the dynamism of innovation. This model has the benefit of reinforcing the relevance of interactions, either among market opportunities, or sources of technological and scientific knowledge or organizational expertise (Da Silva and Degint, 2006). This model breaks down the process of developing new products, processes, and services into five stages: 1) recognition of a potential market; 2) invention or the production of an analytical design for a new product; 3) detailed design, test, and redesign; 4) production; and 5) distribution and marketing. The process typically proceeds linearly, but is supplemented by feedback between adjacent stages that iterates each step as necessary (U.S. Congress, Office of Technology Assessment, 1995).

The third model of model of innovation is the systemic model which takes into account macro factors outside of the firm that will ultimately have an impact on innovation. This model takes into account interactions among companies and between the companies and other private or public research institutions (Da Silva and Degint, 2006). This model therefore provides a comprehensive view of all the players that are involved in innovation.

An alternative view on the categorization of the innovation process includes distinguishing innovation as either science- or technology-driven innovation or market-driven innovation. The former is based on scientific or technological discoveries that create entirely new ways of serving existing or new markets. In the market-driven paradigm, innovative activity takes the form of a search for the best technology or product to meet the anticipated or expressed need (U.S. Congress, Office of Technology Assessment, 1995). Therefore, the science-driven process requires the creation of a market at times as demand for the product may not be in existence at the time of the innovation. As for the market-driven process, demand articulation may be difficult as well given the technical expertise that may be required to meet the expressed need.

Another form of classification is viewing innovation as either radical innovation or incremental innovation. Radical innovations refer to two different dimensions of innovations. Firstly, the extent to which innovation is based on substantially new technology relative to existing technology and secondly the extent to which a market-based innovation is adopted by a small early segment but allows the firm to develop the product and compete in the market thus making the innovation disruptive in the long term. Incremental innovation on the other hand refers to product line extensions or adding modifications to existing platforms and products. (Iya et al, 2006). Incremental advances occur cyclically and, despite proceeding in an evolutionary fashion, can produce sizable cumulative effects (U.S. Congress, Office of Technology Assessment, 1995). Incremental innovation generally forms the bulk of innovative processes.

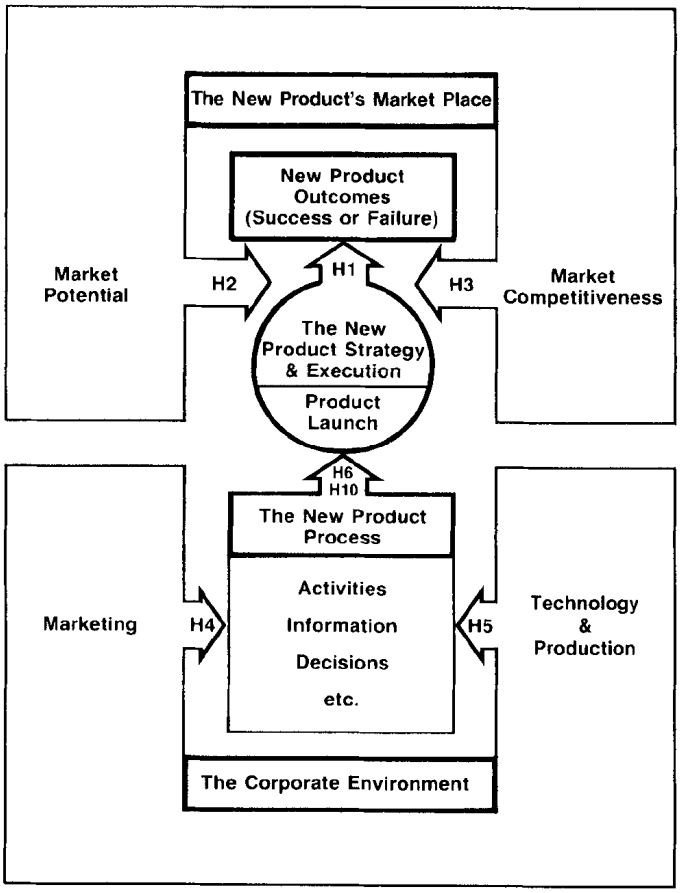
Commercialization is often the end goal of firm when it conducts innovation. Profits arising from a successful innovation could spur significant growth for the company that commercializes the innovation. Iko et al (2000) claim that new product development is virtually established as the most viable tool for long-term corporate growth if properly managed. However, innovation is a costly process. A positive benefit to cost ration is necessary at the inception state to justify the investment in developing and commercializing the innovation. The U.S. Congress, Office of Technology Assessment (1995) posits that firms must anticipate future profits in order to commit to commercializing a new technology. They must therefore be convinced that markets exist for their innovation; that they will be able to appropriate an acceptable share of the total available profits; and that they will be able to develop or acquire the skills and assets needed to bring the innovation to market.

New product development conceptual framework

A firm must be able to identify the factors that separate a winning product from a losing one in order to justify its commercialization. Though no accurate statistics about product success or failure rates were available for the African context, in the U.S., a 1995 study by Information Resources, Inc. found that 70–80% of new product introductions fail, with each failure resulting in a net loss of up to $25 million (Iyer et al, 2006). This shows that product managers have not been very successful at delineating factors necessary to ensure success of a product after it has been launched.

Cooper and Kleinschmidt (1987) have developed a conceptual model of new product outcomes based on previous models that attempts to explain what factors are key to success of a new product. Unlike its predecessors, this model goes a step further through hypothesis testing with a sample of both successes and failures. The model stipulates that new product outcomes (success or failure) are determined from the interaction of the market environment and the new product strategy and execution. Figure one below illustrates the model.

Figure 1: A conceptual model of new product outcomes



Source: Cooper and Kleinschmidt (1987)

Using this model, Cooper and Kleinschmidt test ten hypotheses and distill the results into the following implications:

1. Product superiority is the number one factor in success. Product superiority is composed of: unique benefits for customers, product quality, reduced customers' costs, product innovativeness, product superiority in the eyes of the customer and solution to a customer's problem

2. Project definition and "up-front" activities are vital to success including initial screening, preliminary technical and market assessments, marketing research and business/financial analysis

3. Synergy – both marketing and technological – is a key factor in success

4. Controllable variables, rather than situational or environmental variables, are the dominant factors in success. Controllable variables being proficiency of predevelopment, market-related activities, and technological activities, product advantage, and protocol. Situational/environmental factors include market potential, market competitiveness, marketing synergy and technological synergy. Top management involvement fits into both categories.

Success can be defined in various ways according to Cooper and Kleinschmidt's model. These include profitability level, payback period, domestic market share, foreign market share, relative sales and profits (in comparison with a benchmarked product), sales and profits versus objectives, and extent to which the new product opened a window of opportunity for a new category or new markets. Using Cooper and Kleinschmidt's framework, we assess products that have been successful in the various markets across Africa and the factors that led to their success.

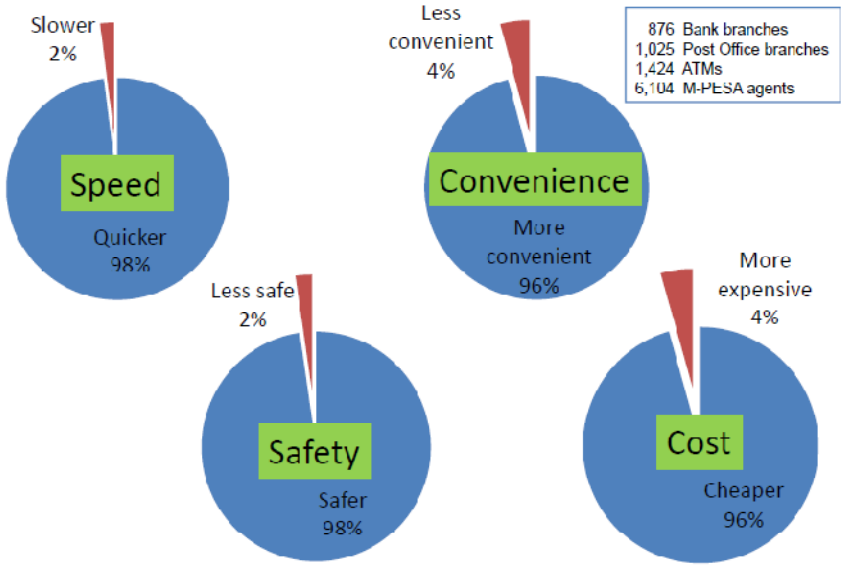
Safaricom, Kenya's M-PESA

M-PESA has emerged as a shining example of innovation in Africa in the telecommunication sector. With the exponential growth of mobile phone technology in Kenya, M-PESA has been a resounding success. Between it's launch on March 2007 and April 2010, the cumulative value of person to person transfers stands at over KSh 432 billion ($5.4 billion). The number of customers has grown from 52,453 in April 2007 to 9,673,837 in April 2010. M-PESA has opened up the mobile money transfer market in the region and is well ahead of any peers anywhere else in the world. By any definition, M-PESA has been a success.

In terms of product superiority, M-PESA fulfilled a need that money transfer methods at the time had been unable to satisfy. Mas and Morawczynski (2009) argue that there was a latent demand for money-transfer services driven by the flow of rural-to-urban migration in Kenya. Although

PostaPay has a presence in rural areas, many complain that the service is inefficient and frequent cash shortages are reported. M-PESA made it faster, cheaper, safer, and more convenient to send money as a study by FSD Kenya in 2006 revealed.

Chart 1: Comparing M-PESA with Alternatives



Source: Pulver, Suri and Jack (2009)

Though the idea of M-PESA sprouted in Vodaphone, Safaricom's parent company in the UK, they did the necessary activities upfront to ensure success including piloting the product. The pilot implementation began on October 11, 2005 in partnership with Faulu Kenya and the Commercial Bank of Africa (Omwansa 2009). The marketing and technical teams have worked successfully to create a simple product and have communicated this strongly through marketing campaigns that include point-of-sale materials that include posters, shop branding and supplemented this with strong above-the-line marketing. In terms of the controllable and environmental variables, both have been in favor of Safaricom's M-PESA. The execution of the launch, the subsequent market-related activities including agent recruitment and monitoring have all contributed to the success of M-PESA.

Diageo Kenya's Senator Lager

Illicit alcohol consumption is a social problem that Kenya has had to deal with given the pricing structure of conventional alcohol has put it out of reach for low income consumers. There have been several instances of death from consuming the illegal brews and spirits. The Senator Story compiled by East African Breweries Limited (EABL) reports that the most extreme case was that of Mukuru Kwa Njenga and Mukuru Kaiyaba in November 2000, where 140 people. There was

a clear need for a safe product with the right quality and price. Diageo, through its arm in Kenya, East Africa Breweries Limited (EABL) set out to solve the problem by providing an alternative. Senator Lager. The beer has been a great success. It managed to capture 44% of the low end alcohol market within a 5 year period. Initially it contributed 2% of EABL's revenue but has since grown to 14%.

As expected, Senator meets the first and most important criterion necessary for a new product to succeed. Alternatives in the market could lead to blindness or death in some cases. The beer was of high quality but even more importantly it was affordable. A 300ml glass retailed at Ksh 20 ($ 0.25). Further to that, EABL supported a formalization process to enable licensing of outlets that previously sold illegal alcohol that became exclusive Senator Keg outlets. This ensured that consumers received high quality beer under hygienic conditions in outlets and prices that were accessible to them.

The upfront activities that EABL conducted included several market assessments. Market research conducted in 2003 showed that the optimal pricing would have to be between Ksh 20 and Ksh 30. Six months into the launch of Senator, EABL carried out a survey through which they were able to establish the size of the potential market was substantial and that it was growing fast. Their distribution assessment using the same route to market as other brands was leading to cannibalization. The Senator Story shows all indications that the "homework" stages necessary for success were done.

EABL set up a multi-functional team to handle the Senator project. The team consisted of members from various departments including production, sales, marketing, research and finance departments. An external marketing agency was also included in the team. The synergy both from a marketing and technological perspective was one of the ingredients that led to the success of the beer.

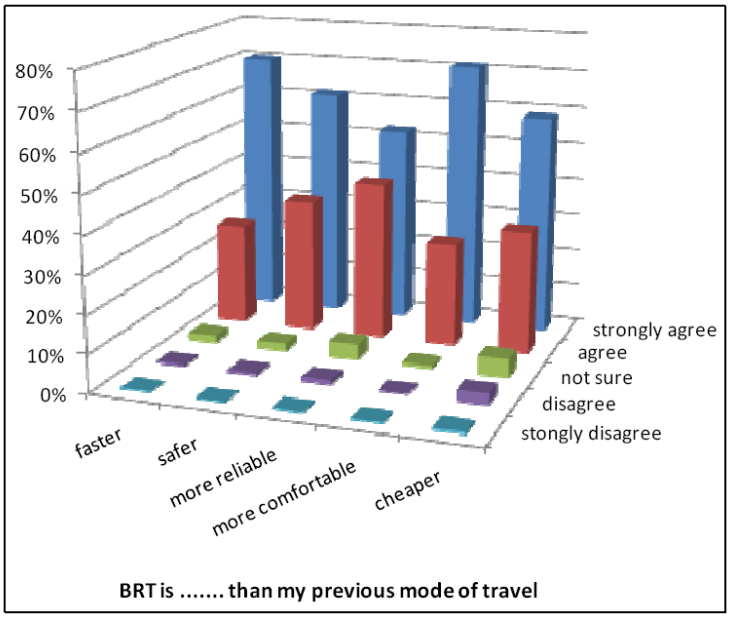
With regard to the controllable variables, EABL's marketing was as innovative as the product itself. It abandoned billboards and product launches and turned to live shows in informal settlements to dispel any misconceptions about the product and recognize the importance of this market segment. Further to that they recruited a team of distributors within the communities to overcome infrastructural challenges. Support from top management was there for the project especially at the stage where they negotiated a 30% tax remission. This effort was led by James Musyoki, the then Managing Director of Kenya Breweries. The tax remission was to later increase to 42% in 2005 and to 100% in 2006 hence supporting further price cuts and enhancing success of the beer.

Lagos, Nigeria's Bus Rapid Transit

Lagos became the first city in Africa to launch the Bus Rapid Transit (BRT) scheme in March 2008 to serve its population estimated at between 15 and 18 million. Before the launch of the BRT scheme, Lagos was the only mega city without an organized public transport system. Traffic congestion has been a great challenge that the transport system was meant to solve. In Lagos, it is referred to BRT-Lite as it is not to the highest specifications. Lagos BRT-Lite Evaluation Final Report (2009) shows that the system now transports 200,000 people per day and in its first 100 days it had carried a total of 9.7 million people; 6 months into its operations, it had carried 29 million people.

An assessment carried out seven months into the operation, showed that the system was superior to previous alternatives that commuters previously used. They were saving journey time, had less interchanges, were travelling cheaper and felt safer thus satisfying the most critical factor for the success of a new introduction into the market.

Chart 2: Comparison of BRT-Lite to alternative modes of transport



Source: Lagos BRT-Lite Evaluation Final Report (2009)

The project's definition from the outset was very clear and the necessary initial activities led to the overall success of the project. The Lagos Urban Transport Project (LUTP) was the initial phase in the creation of the system. The project led to the creation of The Lagos Metropolitan Area Transport Authority (LAMATA) which was the authority in charge of planning and coordinating public transport. LAMATA was in charge of BRT from the onset and performed a

feasibility study in 2006 that encompassed infrastructure, operations, regulatory and institutional reform. A pilot of BRT was to follow. Therefore, the preliminary steps taken were key factors in ensuring success.

In terms of synergy, the Lagos BRT-Lite Evaluation Final Report (2009) claims that planning. LAMATA was staffed with highly motivated individuals with world experience in transport and management largely derived from the Nigerian Diaspora. In terms of the controllable variables, there have been challenges managing supply. Initial forecasts showed that over 300 buses would be needed however they launched 125 buses and later supplemented this with 120 buses leaving gap of 55 buses. To solve this, they allowed the other forms of public transport, molue and danfo (minibuses and midibuses) to operate in the BRT corridor to absorb the excess demand. The BRT-Lite system of Lagos stands out as a first for Africa and a successful one at that.

South Africa's Kreepy Krauly

The original swimming vacuum cleaners were invented by a South African engineer known as Ferdinand Chauvier. The product's success is indisputable as its appeal is global. Irwin (2002) claims that: Kreepy Krauly may arguably be to pool cleaners what VW Beetles are to cars -- first in its category, lovable, and endlessly dependable. He goes on to report that in 1994, the millionth Kreepy Krauly was sold. By 2002, over 1.5 million Kreepy Krauly units had been sold worldwide.

The success of the Kreepy Krauly is because it product that was a pioneer in its category and greatly solved the problems consumers were having in cleaning their pools. At the moment the product has differentiated itself by quality, location and noise. It holds a five-year guarantee, it has been labeled as a "proudly South African" product thus keeping it and unlike the Baracuda, a silent, US-manufactured pool cleaner, consumers prefer the Kreepy Krauly because of its signature sound (Irwin 2002). With regard to project definition, Chauvier's approach did not subscribe to the Cooper and Kleinschmidt model. As he was selling pool equipment, he discovered that cleaning dirty pools were often the result of a difficult, time-consuming process of hand vacuuming; he immediately sat down and drew up the Kreepy Krauly prototype on the back of a cigarette package (Irwin 2002). However, over the years the company has grown with the product and has become more formal in its processes. Kreepy Krauly has been subjected to incremental innovations through partnerships of both market research and technical functions. On the marketing front, communications have been strong thus keeping the African innovation undoubtedly successful.

Macro-environmental factors that affect new product development

The success of the various products must however be taken in context. As the systemic model of innovation postulates, innovation does not occur in isolation. There are various environmental factors that affect the process as well as its outcomes. Innovation systems, upon which the systemic model was developed, refer to the various actors required for innovation to occur. Successful innovation requires the coordinated action of numerous actors who play vastly different roles, from creating new science, to financing startup firms, to developing standards and regulatory regimes (U.S. Congress, Office of Technology Assessment, 1995). In the African context, innovation systems within the various countries are at an embryonic stage. Thus the requisite framework necessary for innovation and ultimately corporate and economic growth to occur is still developing.

Measuring innovation in Africa

There are three main measures used to gauge the level of innovation of a country, that is:

1. Gross Domestic Expenditure on R&D (GERD)
2. The number of researchers present in a country
3. The number of publications in scientific and technical journals
4. The number of patent applications

In terms of financial resources that are dedicated to innovation, the predominant measure is spending on research and development (R&D) is GERD. It is expressed either in absolute terms or as a percentage of GDP or GDP per capita. From a macro-economic perspective, the measure gives us the extent to which a country's invests monetarily in innovation. The table below summarises the GDP allocations in African countries and their relative sizes of their allocations to GERD. The first and clearest observation is the lack of data on R&D spending. The sparse data that exists indicates relatively low investments in R&D. Generally, military, health and education expenditure are higher than that on R&D. South Africa is the biggest spender on R&D and spends 0.9% of its GDP on R&D. This is however still below the 1% recommended target. The South African National R&D strategy (2002) seeks to remedy given that in 1990, R&D spending was 1.1% of GDP. To achieve the 1% target, government investment would need to double.

Table 1: Investment in sub-Saharan Africa, 2008 or most recent year available

	Military expenditure (% of GDP)	Total expenditiure on health (% of GDP)	Public expenditiure on education (% of GDP)	Expenditure on tertiary education (% of total expenditure on education)	GERD (% of GDP)	GERD (in PPP$ thousands)	GERD (per capita PPP$)
Angola	2.9	2.7	2.6[-2]	8.7[-2]	–	–	–
Benin	1.0	5.3	3.6[-1]	20.2[-1]	–	–	–
Botswana	3.5	7.2	8.1[-1]	27.5[-1]	0.5[-2]	111 714[-2]	60.7[-2]
Burkina Faso	1.8	6.4	4.6[-1]	15.2[-1]	0.1[a]	18 392[a]	1.2
Burundi	3.8	3.0	7.2	21.2	–	–	–
Cameroon	1.5	5.2	2.9	9.0	–	–	–
Cape Verde	0.5	5.6	5.7	11.3	–	–	–
Central African Rep.	1.6	3.9	1.3[-1]	21.3[-1]	–	–	–
Chad	1.0	3.6	1.9[-3]	18.7[-3]	–	–	–
Comoros	–	3.2	7.6**	14.6**	–	–	–
Congo	1.3	2.1	1.8[-3]	25.9[-3]**	0.1[-1]*	–	–
Côte d'Ivoire	1.5	3.8	4.6	25.1[-8]**	–	–	–
Dem. Rep. of Congo	0.0	4.3	–	–	0.5[-2, v]	75 217[-2, v]	1.3[-2, v]
Equatorial Guinea	–	1.5	0.6[-5,**]	31.4[-6]	–	–	–
Eritrea	23.6[-5]	4.5	2.0[-2]	19.4[-2]	–	–	–
Ethiopia	1.5	4.9	5.5[-1]	39.0[-1]	0.2[a]	106 753[a]	1.4[a]
Gabon	1.1[-1]	3.7	–	–	–	–	–
Gambia	0.7[-1]	4.3	2.0[-4,**]	12.2[-4,**]	–	–	–
Ghana	0.7	6.2	5.4[-3]	20.8[-3]	–	–	–
Guinea	2.0[-4]	5.7	1.7	34.4	–	–	–
Guinea-Bissau	4.0[-3]	6.2	–	–	–	–	–
Kenya	1.7	4.6	7.0[-2]	15.4[-2]	–	–	–
Lesotho	2.6	6.7	12.4	36.4	0.1[-3, a]	1 563[-3, a]	0.8[-3, a]
Liberia	0.5[-1]	5.6	2.7	_	–	–	–
Madagascar	1.1	3.2	2.9	15.4	0.1[a]	25 753[a]	1.4[a]
Malawi	1.2[-1]	12.3	4.2[-5]	_	–	–	–
Mali	2.0	6.0	3.8	16.1	–	–	–
Mauritius	0.2[-1]	4.3	3.4[+1]	11.0[+1]	0.4[-2, v]	47 014[-2, v]	37.5[-2, v]
Mozambique	0.9	4.7	5.0[-2]	12.1[-2]	0.5[-1]	83 105[-1]	3.9[-1]
Namibia	3.1	4.9	6.5	9.9	–	–	–
Niger	0.0[-3]	4.0	3.7	9.4	–	–	–
Nigeria	0.0	4.1	–	–	–	–	–
Rwanda	1.5	10.4	4.1	25.4	–	–	_
Senegal	1.6	5.4	5.1**	24.5**	0.1[-2, a, *]	16 252[-2, a, *]	1.4[-2, a, *]
Seychelles	1.0	6.8	5.0[-2]	17.9[-2]	0.3[-2]	4 519[-2]	54.5[-2]
Sierra Leone	2.3	3.5	3.8[-3,**]	_	–	–	–
South Africa	1.4	8.6	5.4[+1]	12.5[+1]	0.9[-1]	4 100 875[-1]	84.3[-1]
Swaziland	2.1[-1]	5.9	7.9	21.3[-2]	–	–	–
Togo	2.0	5.5	3.7[-1]	21.4[-1]	–	–	_
Uganda	2.3[-1]	7.2	3.3[+1]	13.3[+1]	0.4	128 012	4.2
United Rep. of Tanzania	0.9	5.5	6.8	–	–	–	–
Zambia	1.8	5.2	1.4	25.8[-3]	0.0[-2, a]	3 840[-2, a]	0.3[-2, a]
Zimbabwe	3.8[-3]	8.4	4.6[-8]**	16.6[-8]**	–	–	–

-*n*/+*n* = data refer to *n* years before or after reference year

* national estimate; ** UNESCO Institute for Statistics estimation; a = partial data; v = overestimated or based on overestimated data

Source: for expenditure on education and GERD: UNESCO Institute for Statistics; for military expenditure: World Bank, World Development Indicators, June 2010; for health expenditure: WHO (2009) *World Health Statistics*

Adopted from: UNESCO, 2010

The second measure of the extent to which Africa is investing in innovation is the number of researchers in each of the countries. Nigeria, Africa's most populous country, has the largest number of researchers standing at 28,533, 96% of whom are in higher education. Botswana however has the highest ratio of researchers to inhabitants. There are 942 researchers per million inhabitants. The table below summarises the number researchers for select African countries.

Table 2: Researchers in sub-Saharan Africa, 2007 or most recent year available
Selected countries

Country	Total number of researchers (FTE)	Share of women researchers (%)	Researchers per million inhabitants (FTE)	Technicians per million inhabitants (FTE)	Researchers by sector (FTE)			
					Business enterprises	Government	Higher education	Private non-profit
Benin	1 000*	–	119*	–	–	–	–	–
Botswana[2,h]	1 732*	30.8	942	222	159*	692*	859*	22*
Burkina Faso[a,h]	187	13.4	13	27	–	165[b]	1[b]	15[b]
Cameroon[-2,a,h]	462	19.0	26	–	–	462	–	–
Cape Verde[-5]	60	52.3	132	33	–	–	–	–
Central African Rep.[a,h]	41	41.5	10	–	–	–	41	–
Congo, Rep.[-5,a]	102	12.8[f]	34	37	..	..	..	..
Côte d'Ivoire[-2,a]	1 269	16.5	66	–	–	29	1 240	–
Dem. Rep. of Congo[-2,h]	10 411	–	176	26	–	877	9 534	–
Ethiopia[a]	1 615	7.4	21	12	–	1 361	254	–
Gabon[-1,a,h]	150	24.7	107	30	–	150	–	–
Gambia[2,a,h]	46	8.7	30	18	–	–	–	–
Guinea[-7,a,h]	2 117	5.8	253	92	–	1 096	1 021	–
Lesotho[-3,a]	20	55.7	10	11	–	11	9	–
Madagascar[a]	937	35.2	50	15	–	262	675	–
Mali[1,a]	513	12.1	42	13	–	227	286	–
Mozambique[-1,a,h]	337	33.5	16	35	–	337	–	–
Niger[2,a]	101	..	8	10	..	..	..	..
Nigeria[2,a,h]	28 533	17.0	203	77	–	1 051	27 482	–
Senegal[a]	3 277*	9.9*	276*	–	–	418*	2 859*	–
Seychelles[-2,a]	13	35.7	157	640	–	8	–	5
South Africa[-1]	18 574	39.7	382	130	6 111	2 768	9 491	204
Togo	216	12.0	34	17	–	26	190	–
Uganda[h]	891	41.0	29	18	71	473	321	26
Zambia[-2,a]	792	27.4	67	106	4	565	146	77

* national estimate; a = partial data; b = the sum of the breakdown does not add up to the total; h = for these countries, data are only available for headcount; F = full-time equivalent (FTE) instead of headcount

Source: UNESCO Institute for Statistics

Adopted from: UNESCO 2010

The third measure, which is related to the second, is the number of publications produced in scientific and technical journals. Despite having the highest number of researchers, Nigeria lags far behind South Africa in terms of productivity. More impressively for Nigeria is the growth that has been exhibited. Between 2001 and 2008, the number of publications grew by 158% percent thus eclipsing South Africa's growth of 61.9%. The rest of the top 7 research publication

producers have also exhibited an upward trend. The majority of publications in 2008 were on clinical medicine, biology and biomedical research.

Chart 3: Scientific publications in sub-Saharan Africa, 2000 – 2008
For those countries that produced more than 100 publications in 2008

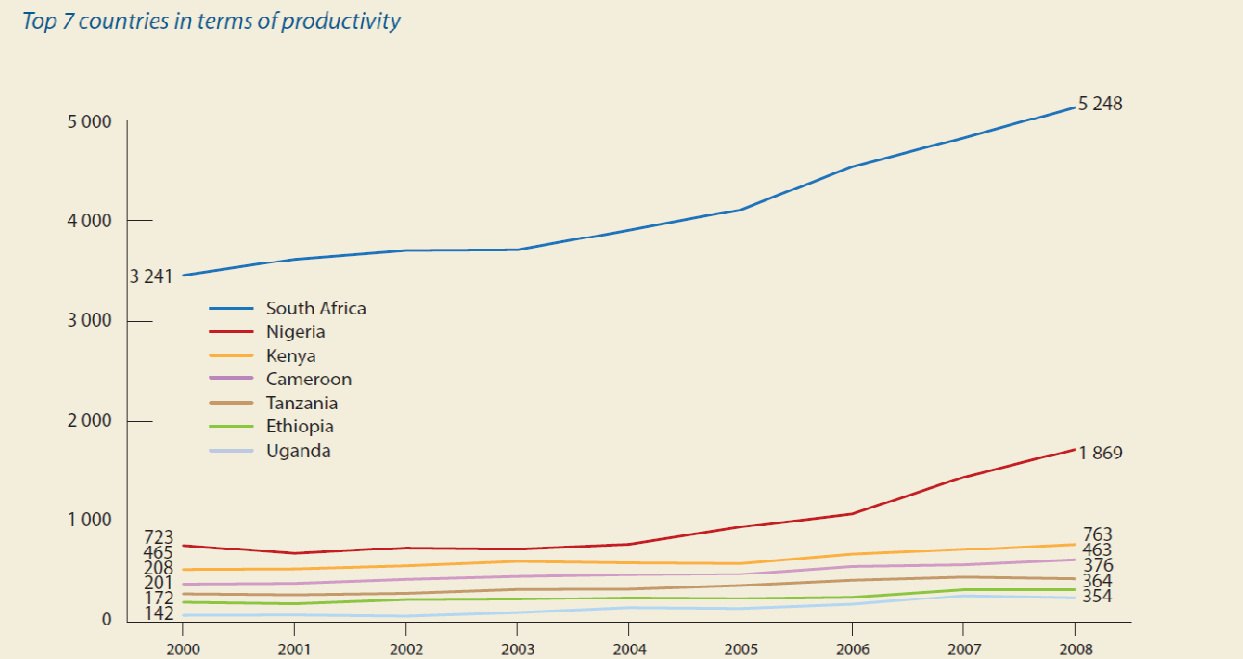
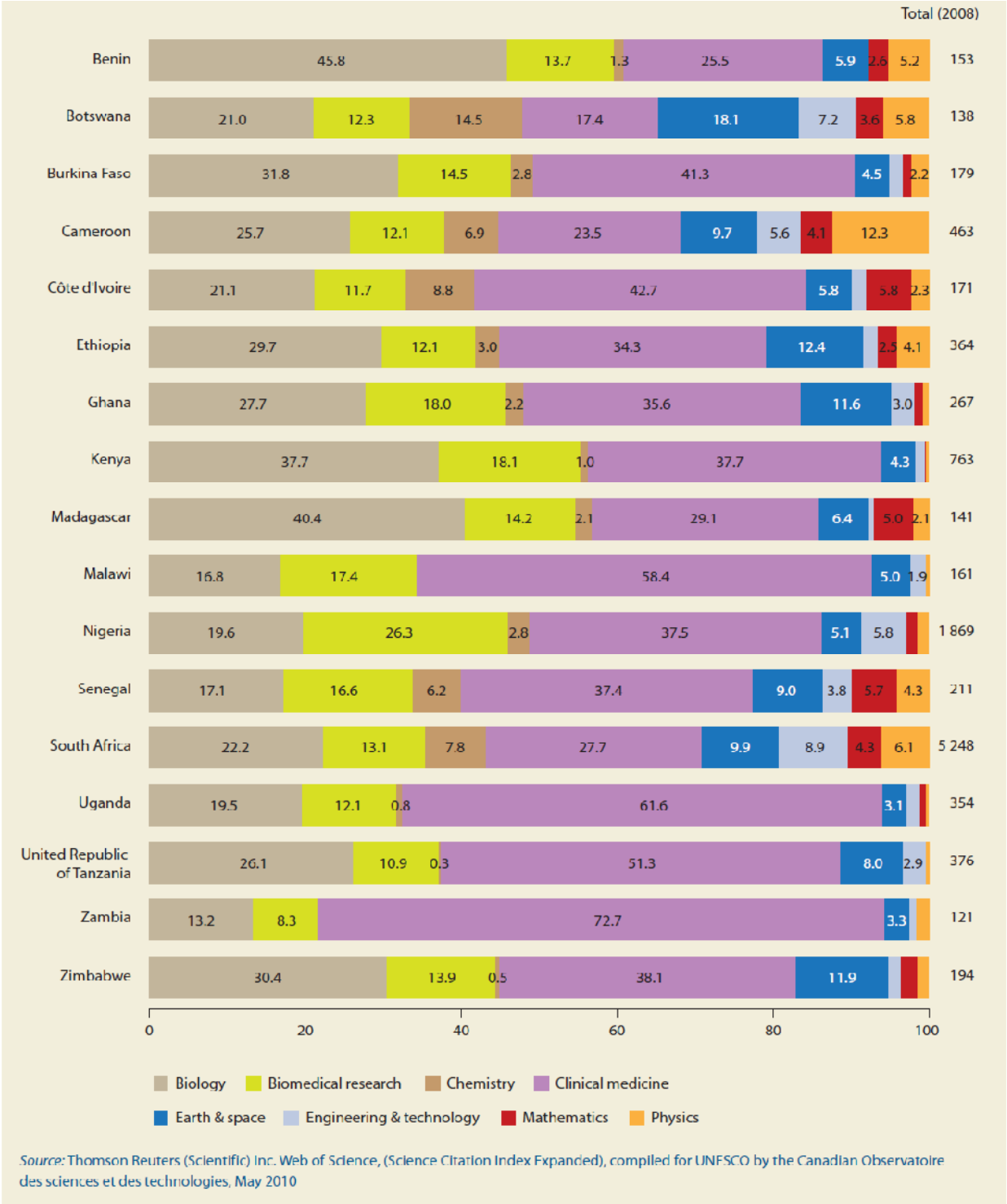


Chart 4: Publications in sub-Saharan Africa by major field of science, 2008 (%)
For those countries that produced more than 100 publications in 2008



Source: Thomson Reuters (Scientific) Inc. Web of Science, (Science Citation Index Expanded), compiled for UNESCO by the Canadian Observatoire des sciences et des technologies, May 2010

Adopted from: UNESCO, 2010

The fourth and final measure that we could use to gauge the level of innovation in Africa is the number of patents that have been applied for. However in the absence of comprehensive data, an alternative measure is in terms of the actual awards by the U.S. Patents and Trademark office. The table below shows that South Africa was well ahead of the rest of Africa, sub-Saharan African and Arab states in Africa alike. Actually the combined output of all the other top countries in the table below still does not match South Africa.

Table 3: Patents awarded to African inventors by USPTO, 2005-2009

	2005				2006				2007				2008				2009				Total			
Sub-Saharan Africa:	Utility	Design	Plant	Reissue	Utility	Design	Plant	Reissue	Utility	Design	Plant	Reissue	Utility	Design	Plant	Reissue	Utility	Design	Plant	Reissue	Utility	Design	Plant	Reissue
Benin									1												1			
Burkina Faso																	1				1			
Cameroon									1								1				2			
Chad													1								1			
Ethiopia									1												1			
Gabon									1												1			
Ghana									1												1			
Kenya	9	1			3				1				4				7				24	1		
Mauritius														1								1		
Namibia									1												1			
Seychelles					2									1							3			
South Africa	87	16	5		109	13	5		82	30	3		91	32	1		93	39	6	1	462	130	20	1
Zimbabwe	1				1				1								4				7			
Arab states in Africa:																								
Algeria					1																1			
Egypt	7				4				12				2				3				28			
Morocco	1				3				1				4				1	2			10	2		
Tunisia	1				2								2								5			

Note: The country of origin is determined by the residence of the first-named inventor. Utility patents are for new inventions.

Source: data from United States Patents and Trademark Office

Adopted from: UNESCO, 2010

Intellectual Property Rights

Patents form part of the protection necessary to ensure that a firm enjoys profits from an invention that later forms the basis for the innovation process. Intellectual property rights (IPRs) encompass not only patents but also utility models, industrial designs, trademarks and service marks, geographical indications and layout of integrated circuits, copyright, and plant breeder' rights (Institute of Economic Affairs, 2007).

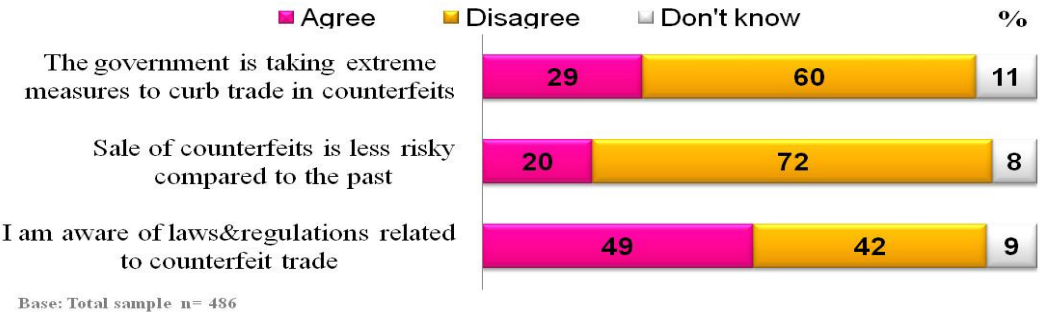
The World International Property Organisation (WIPO) administers the Paris Convention in 1883 for the protection of industrial property rights and the Berne Convention in 1886 for the protection of copyrighted works. The legal framework necessary for such protections also exists in African. African Regional Industrial Property Organization (ARIPO) is charge with process and grant patents in a central place on their behalf. This makes the process of seeking for protection cheaper as it avoids duplication (Institute of Economic Affairs, 2007). It is important to note that even with the binding agreements and treaties that countries enter into, enforcing them is where the challenge lies. Ayogu and Ogbu (2002) argue that strict enforcement of patents, copyrights and licenses could be very costly. Reverse engineering, imitation, or inventing around the patent might be easy.

In Africa, individual governments have also put in place a legislative framework that governs IPRs. South Africa's system is Africa's most advanced and dates back to 1916. It precedes most industrialized countries. The Ginarte Park index on the strength of patent protection, but in addition also assessed the extent of copyright and trademark protection to construct an overall intellectual property score, gave South Africa seven out of a possible 10 – 22nd highest out of 115 countries (Kaplan, 2009). Such a strong framework is particularly important given the volume of research produced by South Africa. The regime, administered by the Companies and Intellectual Property Registration Office (CIPRO), provides strong incentive to researchers and innovators to continue to develop innovations and to profit from them.

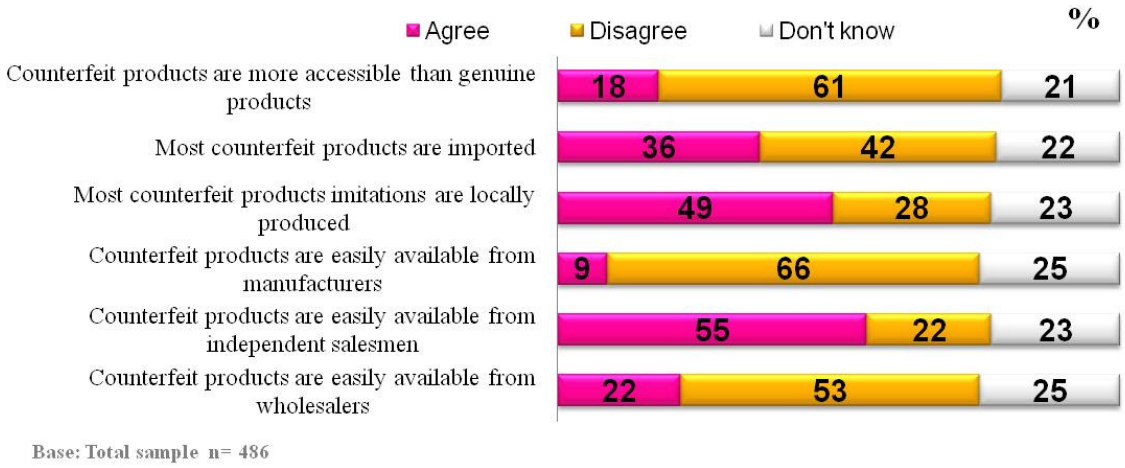
Counterfeits

The actual implementation of IPRs however presents the biggest challenge for African countries especially with the counterfeits that infringe on other's trademarks and innovations. Laws and institutions governing IPRs exist however counterfeit goods still find their way into the hands of consumers. According to the Nairobi Law Monthly (2010), the counterfeit industry in Kenya is now valued at KSh70 billion industry ($886 million). The loss to both affected companies as well as the government is substantial. The Nairobi Law Month put this loss in tax revenue at KSh40 billion ($500 million) in the East Africa region, with half of the loss in Kenya. To stem the loss, the IPR regime needs to be bolstered and education on the laws must be cascaded downward to the retailers who interface with the customer and present an important intervention point to curb the illegal trade.

A national survey conducted by TNS RMS amongst retailers across Kenya indicates that the hardest hit categories are ballpoint pens, shoe polish, computer software, batteries, toothpaste, medicines, laundry detergent and bleach, cigarettes, petroleum jelly and electronics. The study reveals that 60% of the shopkeepers have reservations about the government's intervention in curbing trade in counterfeit products. However, a majority of them contend it is a riskier affair to trade in counterfeits compared to the past. Education of retailers on the laws is also a key finding of the report as half are not aware of laws and regulations relating to counterfeit trade.



The retailers also provided an insightful perspective on accessibility and what they believe is the source of counterfeit goods. Close to half (49%) agree that most counterfeits are manufactured locally with 55% agreeing that the counterfeits are easily available from independent salesmen.



If the retailers' perspective indeed gives a true picture of the state of the counterfeit industry and is not simply a matter of perception, then to stem the tide of counterfeits therefore, efforts must be focused locally.

Conclusion

Innovation and new product development must form an integral part of corporations venturing into Africa as the continent is ripe with opportunities waiting to be discovered. To succeed on the continent, new products and services must adhere to the cardinal rule of maintaining close contact with the consumers for whom the innovations are targeted. Constant feedback and incremental innovations cumulatively lead to improvements that keep the company's products and services refreshed and thus relevant to their target markets.

M-PESA in Kenya is world leader in mobile money transfer and has so far over KSh 432 billion ($5.4 billion) has been transferred through the network. Africa's telecommunications industry is clearly leapfrogging the Western world in regard to mobile technologies. Senator Lager, another Kenyan innovation, has revealed the enormous potential that lies in the bottom of the pyramid consumers. The BRT buses in Lagos have charted the way for growing metropolises across the continent. The Kreepy Krauly is a classic innovation out of South Africa is yet another world leader that has revolutionized how swimming pools are cleaned the world over.

Kreepy Krauly's success must however be viewed in context since all major innovation measures show that South Africa is the leader in research on the continent. However there is need for increased investment, both in terms of financial resources and human capital. The framework governing intellectual property across Africa must be bolstered and implemented with vigor. As the continent continues to grow economically, socially and politically, innovation is growing with it to meet the increasingly complex needs of the continent. Indeed, Africa is the next frontier with regard to innovation.

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