

# Mobile Business Models in African Rural Communities

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# Declaration

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# Abstract

Mobile telephone subscription in developing countries has increased by more than 500 percent since 2005, with Africa experiencing the highest growth rate globally. Amongst Africa's 306.5 million subscribers, recorded in 2008, an unexpectedly high adoption rate of the technology by poor, often illiterate rural communities is observed. Mobile telephony generally provides African rural users access to electronic communication for the first time. Providing access to communication, information and knowledge, mobile phones present a platform for economic and social interaction in rural Africa. The extent of the resulting positive socio-economic impact on the developing world has led to mobile telephony increasingly being viewed as a potential development tool for the socio-economic upliftment of the rural poor.

This thesis is inspired by the potential for value creation to end users of mobile telephony, leading to the proposition that the rapid expansion of mobile telephony in rural Africa can contribute significantly to the sustainability of these communities' rural livelihoods. For this proposition to be valid, mobile telephony has to provide value beyond being communication tool. It has to provide value in income generating activities by increasing opportunities for access to financial and social capital with mobile business models appropriate to the rural African context.

To assess the *appropriateness* of mobile value offerings, the rural African context was analyzed using the Sustainable Livelihoods Framework. Through multi-level analysis, the challenges and issues that influence the lives of the rural poor were explored and the dominant livelihood strategies in terms of income generating activities were identified. Apart from *agricultural income streams*, waged labor, migration and micro-entrepreneurial activities provide *non-agricultural income streams*.

Creating an appropriate mobile business ecosystem for rural Africa requires the collaboration of a complex network of actors within a *value constellation* to co-produce value for the end users. Three conditional factors were identified for mobile telephony and emerging mobile business models to contribute successfully to sustainable livelihoods: *adaptation* of the technology by providers, user *appropriation* to make the technology their own and the *assimilation* of it into their livelihood strategies. These factors were researched for validation

through the study of existing literature and reported case studies. It was found that these three conditional factors were unequivocally met.

*Firstly*, the mobile telecommunication industry active in Africa is seen to successfully *adapt* and innovate solutions that are relevant to African rural communities' vulnerabilities and livelihood strategies. *Secondly*, African mobile phone users have successfully adopted and appropriated mobile telephony to create value for themselves in their livelihood strategies, often independent of external interventions. They are claiming ownership of the technology and not merely using it as a communication tool. *Thirdly*, by assimilating mobile telephony into their livelihood strategies, value-creation within their income generating activities have been made possible. This value creation is impacting users' social and financial capital positively.

This thesis concludes that mobile telephony and emerging mobile business models are contributing to increasing African rural dwellers' income generating potential, reducing their vulnerability to shocks, and providing them with a voice; thereby contributing to sustainable rural livelihoods.

# Opsomming

Sedert 2005 het intekensyfers van mobiele fone meer as 500 persent gestyg, terwyl Afrika die hoogste groeisyfer vertoon. Onder die 306.5 miljoen mobiele foon gebruikers aangeteken in Afrika in 2008, is daar 'n onvoorsiende hoë opname onder arm, dikwels ongeletterde, landelike gemeenskappe. Mobiele telefonie bied meestal die eerste toegang tot elektroniese kommunikasie aan landelike gebruikers in Afrika. As die primêre tegnologie vir toegang tot kommunikasie, inligting en kennis in landelike Afrika, bied mobiele fone 'n platform vir ekonomiese en sosiale interaksie.

Verskeie studies toon dat die groei in mobiele telekommunikasie 'n positiewe effek het op die sosio-ekonomiese status van ontwikkelende lande, met betekenisvolle waarde vir die gebruikers van die tegnologie. Die gevolg is dat mobiele telefonie toenemend beskou word as 'n potensieële ontwikkelingsinstrument vir die sosio-ekonomiese opheffing van die landelike verarmdes.

Hierdie tesis lewer die proposisie dat mobiele telefonie in landelike Afrika 'n betekenisvolle bydrae kan lewer tot die volhoubaarheid van hierdie gemeenskappe se landelike lewensbestaan. Om 'n geldige proposisie te wees, moet mobiele telefone waarde lewer in landelike mense se inkomstegenererende aktiwiteite deur toegangseleenthede tot finansiële en sosiale kapitaal te vermeerder, deur middel van mobiele besigheidsmoedele wat gepas is tot Afrika se landelikse konteks.

Om vas te stel of mobiele waarde-aanbiedinge gepas is, is Afrika se landelike konteks geanaliseer volgens die *Sustainable Livelihoods Framework*. Die belangrikste strategieë vir lewensbestaan in terme van inkomstegenererende aktiwiteite is geïdentifiseer. Benewens *landbou-inkomstestrome* dra besoldigde arbeid, migrasie en mikro-ondernemingsaktiwiteite by tot *nie-landbou-inkomstestrome*.

'n Toepaslike *mobiele besigheidsekosisteem* vir landelike Afrika vereis die samewerking van 'n komplekse netwerk van rolspelers in 'n *waardekonstellasie* om waarde vir gebruikers te skep. Drie kondisionele faktore is geïdentifiseer vir mobiele telekommunikasie en mobiele besigheidsmoedele om suksesvol by te dra tot die volhoubaarheid van die lewensbestaan van Afrika se landelike gemeenskappe. Mobiele tegnologie moet *aangepas* word tot die plaaslike konteks. Gebruikers moet die tegnologie doelbewus *approprieer* en self aanpas om

eienaarskap daarvan te neem soos dit by hul lewensbestaan inpas. Deur mobiele telefonie te *assimileer* in hul strategieë vir lewensbestaan moet waardeskeppingsgeleenthede moontlik gemaak word wat kan lei tot die vermeerdering van lewensbates. Bestaande literatuur en gevallestudies is ondersoek vir die teenwoordigheid van hierdie drie faktore. Daar is bevind dat al drie kondisionele faktore sonder enige twyfel aan voldoen word.

*Eerstens* is daar aanduidings dat die mobiele telekommunikasie-industrie toepaslik reageer deur voortdurende aanpassing of innoovering van nuwe oplossings wat suksesvol op die plaaslike konteks gerig is. *Tweedens*, gebruikers van mobiele telefone in die landelike gemeenskappe van Afrika het die tegnologie suksesvol toegeëien deur vir hulself waarde te skep in hul gebruik van mobiele telefone, dikwels sonder enige toetredings van eksterne rolspelers. *Derdens*, waarde wat mobiele telekommunikasie vir die gebruikers skep in inkomstegenererende aktiwiteite het 'n positiewe impak op hul sosiale en finansiële kapitaal.

Hierdie tesis kom tot die gevolgtrekking dat mobiele telefonie en mobiele besigheidsmodelle bydra tot die vermeerdering van landelike gemeenskappe in Afrika se inkomstegenereringspotensiaal en die vermindering van hul kwetsbaarheid; dit bied hulle 'n stem en dra as sulks by tot die volhoubaarheid van hul lewensbestaan in landelike Afrika.

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# List of Abbreviations

3G	Third generation
CAPEX	Capital Expenditure
CDMA	Code Division Multiple Access
DARE	De-Agrarianization and Rural Employment
DFID	Department for International Development
ECAMIC	Eastern Corridor Agro-Market Information Centre
EPROM	Entrepreneurial Programming and Research on Mobiles
FBST	Features-Based Theory of Sensemaking Triggers
GDP	Gross Domestic Product
GSM	Global System for Mobile Communications
GSMA	Global System for Mobile Communication Association
ICT	Information and Communication Technologies
IICD	International Institute for Communication and Development
IMF	International Monetary Fund
InfoDev	Information for Development Program
ISP	Internet Service Providers
IT	Information Technology
ITU	International Telecommunication Union
KACE	Kenya Agricultural Community Exchange
LLSTI	Local Language Speech Technology Initiative
M2M	Machines to Machines
MIT	Massachusetts Institute of Technology
MNO	Mobile Network Operators

MTO	Money Transfer Operator
NAFIS	National Farmers Information Services (Kenya)
NALEP	National Agriculture and Livestock Extension Programme (Kenya)
NGO	Non-Governmental Organization
ODI	Overseas Development Institute
OECD	Organization of Economic Cooperation and Development
OPEX	Operating Expenditure
P4P	Purchase for Progress
PDA	Personal Digital Assistants
PIN	Personal Identification Number
SAP	Structural Adjustment Programmes
SCOT	Social Construction of Technology
SL	Sustainable Livelihoods
SMS	Short Message Service
SST	Social Shaping of Technology
TTS	Text-to-speech
U2M	Users to Machines
U2U	Users to Users
UNDP	United Nations Development Programme
VPP	Village Phone Program
WDR	World Development Report
WFP	World Food Programme
WiMAX	Worldwide Interoperability for Microwave Access
WSIS	World Summit on the Information Society
WTO	World Trade Organization
WAP	Wireless Application Protocol

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# Chapter 1

## Introduction: The Information Age and Africa

### 1.1 Mobile Telephony in Africa: Hype or Hope?

With technological innovation and its adoption racing ahead in the developed world, digital information and communication technologies<sup>1</sup> (ICTs) have transformed all aspects of everyday life. The modern world has experienced a fundamental transformation from the industrial society of the twentieth century to the networked information society of the twenty-first century. The global economy is increasingly based on the exchange of information and knowledge and there is a danger of developing countries being left behind again, this time technologically, leading to what is referred to as the *digital divide*<sup>2</sup>.

Turning the digital divide into *digital opportunities*<sup>3</sup> remains an ongoing challenge, but the extraordinary expansion of the mobile network during recent years in developing countries could potentially provide that opportunity. ICTs have finally reached poor households and remote communities through the mobile phone, where it does not just compliment or substitute fixed-line services, but more often than not provide access to electronic communication for the first time. Mobile telecommunication has the potential to positively impact on the socio-economic status of the developing world. In 2005 the Economist reported that mobile-phone firms found a profitable way to help the poor help themselves<sup>4</sup>. This viewpoint has since been reiterated by many others: “...in Sub-Saharan Africa a mobile phone can be a passport out of poverty”<sup>5</sup>; “...the mobile phone boom has transformed

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<sup>1</sup> The Department of International Development (DFID) defines ICTs as: *technologies that facilitate communication and the processing and transmission of information by electronic means.*

<sup>2</sup> The global digital divide expresses the difference in facilities for people to communicate, relative to their geographic location, their living standard and their level of education. Increasingly, it is seen as an indicator of a country’s socio-economic status, with persistent poverty and inequality having a direct impact on the extent the digital divide. Source: Marine & Blanchard, 2004

<sup>3</sup> Marine & Blanchard, 2004

<sup>4</sup> “Calling and end to poverty”, Economist, 2005 Vol. 376

<sup>5</sup> Wray & Mavet, 2007

ordinary people into micro-entrepreneurs”<sup>6</sup> and “...the cell phone is the single most transformative technology for development”<sup>7</sup>, to mention only a few of the optimistic reports in the media.

Is there really hope for the poverty stricken communities of Africa and the rest of the developing world in a time when the World Bank has recently raised the global poverty count from just under a billion to 1.4 billion?<sup>8</sup> Or, having found their own El Dorado<sup>9</sup> in the network society phenomenon, is the first world investing in yet another misguided economic development effort?<sup>10</sup> Or is the market-driven first world just grooming new markets for the levels of consumerism required to keep their own economic engines running smoothly? Are they exploiting the rural poor, marginalized by the first worlds’ institutions through their monetary policy demands? These poor communities have difficulty financing their most basic needs, let alone finding the extra money to pay for mobile telecommunication.

Evidence of the unexpected, phenomenal growth rate of subscription to mobile telephony in Africa indicates that people with low incomes are willing to spend money on telecommunication. It shows that uptake has not been limited to the relatively better off urban Africans, but has also penetrated into rural Africa. It gives credence to the ideas expressed by C.K. Prahalad<sup>11</sup> that the *bottom of the pyramid*<sup>12</sup> is a viable market for private enterprise. The question is however whether it is a luxury that adds to the financial burden of the African rural communities; or is mobile telephony a valuable tool, integral to the improvement of their livelihoods? Emerging academic and anecdotal evidence of the socio-economic impact of mobile telephony in the developing world support the optimistic media reports, refuting the idea that mobile telephone as a *passport out of poverty* is only media hype.

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<sup>6</sup> Anderson T, 2007

<sup>7</sup> Ewing J, 2007 quoting Jeffrey Sachs, Colombia University economist and emerging market expert

<sup>8</sup> Collier P, 2008

<sup>9</sup> The name *El Dorado* is used metaphorically of any place where wealth could be rapidly acquired. It represents the ultimate prize or “Holy Grail” that one might spend one’s life seeking, however it might not even exist or represent what one was seeking. (Source: [http://en.wikipedia.org/wiki/El\\_Dorado\\_\(legend\)](http://en.wikipedia.org/wiki/El_Dorado_(legend)))

<sup>10</sup> Despite US\$568 billion in aid poured into Africa in the past fifty years Africans are now poorer than twenty-five years ago. The rate of failure of African agricultural aid projects is reported to be as high as seventy-five percent, mostly due to misguided spending. The fish processing plant on Lake Turkana, built by the Norwegian government in the 1970s for a community of cattle herders without a culture of fishing, is a classic example of a spectacular failure. A common criticism is that aid is often determined not by what poor countries need, but by what rich countries want to give to boost their own economies.

<sup>11</sup> Prahalad CK, 2004

<sup>12</sup> Referring to the 4 billion people worldwide living on less than US\$2 per day

Research has shown that the economic impact of mobile telephony on a country's GDP is directly related to the number of subscribers<sup>13</sup>. Substantial penetration of mobile telephony in Africa, and rural Africa specifically, is therefore a pre-requisite for any significant economic impact to become a possibility. Existing research reports are providing the evidence that this pre-requisite condition is rapidly being met as more and more people across remote distances are being connected. However, the predicted potential economic impact cannot be limited to a macroeconomic scale, with the rural poor only experiencing secondary benefits from the trickle-down effect. In order for the mobile phone to be a *passport out of poverty*, value has to be created for users at a local level, benefitting them directly. The McKinsey and Company<sup>14</sup> management consulting group has shown in their research that mobile telephony does indeed create substantial value for its end users.

Within the rural African context, this potential value created by mobile telephony for end users should contribute to poverty alleviation and sustainable rural livelihoods. However, it can only do so if it improves their access to resources. The mobile phone can therefore not be merely valued as a communication tool. It has to provide value in income generating activities, which implies the concept of mobile business models. This research will be exploring the value creation for end users with the question of how mobile telephony and its emerging mobile business models are impacting African rural communities.

The evidence that this research question is grounded on, namely the growth of mobile penetration in Africa in general, and rural Africa specifically, as well as the potential economic impact, will be briefly discussed in the sections to follow.

## **1.2 Africa is getting connected**

Globally, the mobile phone has become a key information and communication device. With an estimated 3.5 billion mobile phones in use around the world, the mobile phone has become the most diverse and widely used piece of technological equipment, surpassing fixed line telephone, radio or television<sup>15</sup>. More people now have one than do not and it has changed the way societies and communities organize themselves and do business. The mobile phone industry is unique in its rate of innovation, in terms of providing coverage to remote areas, handsets and the range of services on offer. The ongoing, dual increase in coverage and

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<sup>13</sup> Roeller & Waverman, 2001

<sup>14</sup> McKinsey & Company, 2006

<sup>15</sup> Kinkade S & Verclas K, 2008. p8

affordability had the positive effect of mobile phones now being used as multi-purpose devices by many people in developing countries, instead of only being viewed as a calling device for high-income consumers. With an increase in mobile subscription in developing countries by over 500 percent since 2005<sup>16</sup>, there are now twice as many mobile phone owners in developing countries as in industrialized countries.

The number of mobile connections in Africa has risen from 195.8 million in 2006 to 306.5 million in 2008, showing the highest growth rate globally, according to research by Wireless Intelligence<sup>17</sup> (see Table 1.1). This 57 percent growth rate was partly due to the extension of the GSM (Global System for Mobile communications)<sup>18</sup> network coverage in 2007 to reach an additional 550 000 square kilometers, occupied by 46 million people. It is predicted that the number of mobile phone subscribers globally will rise to four billion by 2010<sup>19</sup>. Based on current trends, Africa will form a substantial part of this projected growth, thereby impacting the digital divide positively.

Market	Q4 2006	Q2 2007	Q4 2007	Q2 2008	Growth
World	2,190,084,047	2,432,990,168	2,709,900,985	2,925,454,308	34%
Africa	195,832,145	232,061,178	273,079,330	306,485,511	57%
Americas	218,384,266	255,639,490	302,471,377	338,342,270	55%
Asia Pacific	825,958,067	949,496,716	1,082,653,571	1,219,674,193	48%
Middle East	128,538,868	148,180,842	170,277,699	190,634,697	48%
Europe: Eastern	339,735,325	361,706,937	395,030,491	401,945,699	18%
USA/Canada	90,896,552	95,238,160	96,720,693	97,552,031	7%
Europe: Western	390,738,824	390,666,845	389,712,986	370,819,907	-5%

**Table 1.1** Number of GSM Connections

(Source: *Wireless Intelligence 2008*)

As a *network society*<sup>20</sup> phenomenon, the main factors that are monitored when measuring the digital divide are the penetration of telephone subscribers and Internet users. The extent to which mobile phones are used, and the ease with which new users can access them, is crucial

<sup>16</sup> Mendes S et al, 2007 citing Wireless Intelligence, 2007, p6.

<sup>17</sup> Wireless Intelligence, 2008

<sup>18</sup> GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. As the technology that underpins approximately 86 percent of the world's mobile phone networks, it is leading the global mobile standards. GSM technology is creating a wireless evolution through a family of technology platforms: GSM, GPRS, EDGE, 3GSM. Source: <http://www.gsmworld.com/technology/gsm.shtml>

<sup>19</sup> Heeks and Jagun, 2007

<sup>20</sup> In terms of Manuel Castells' definition the *Network Society* is a society where the key social structures and activities are organized around electronically processed information networks

in terms of their economic and social effects. The reason is that there are strong network effects accruing from mobile phone subscription. The network effect of high levels of penetration is well understood in developed markets. The models for measuring penetration in the developed world, however, can not simply be extrapolated, because the way in which mobile phones are used, valued and owned in the developing world is very different from developed countries. Measuring *personal ownership* as an indicator of the rate of mobile penetration and adoption is not relevant to the developing world, because they underestimate the full extent of adoption of mobile technology. Through innovative and entrepreneurial ways, usage of the technology in rural Africa has been extended beyond the model of personal ownership<sup>21</sup>. Phones are not always personally owned, but used in a communal facility or shared among individuals.

While mobile services have become more accessible and affordable, Internet access has not kept pace. It has been estimated that there were about 50 million Internet users in Africa by the end of 2007, with over half of these users located in South Africa and North African countries. It is noted in the International Telecommunication Union's (ITU) 2008 report on Africa's telecommunications and ICT indicators<sup>22</sup> that, with an average monthly Internet subscription rate of almost US\$50, representing close to 70 percent of the average per capita income, Africa has the most expensive bandwidth.

According to the ITU report it is foreseen that broadband internet access will become more prevalent in Africa through wireless technologies such as third generation (3G) mobile and WiMAX (Worldwide Interoperability for Microwave Access)<sup>23</sup>. Deploying WiMAX in rural areas with limited or no internet backbone will be a difficult and expensive task as additional methods and hardware will be required to procure sufficient bandwidth from the nearest internet backbone.

With affordability and accessibility remaining a stumbling block in uptake<sup>24</sup>, the Internet is not delivering any benefits to remote, poor African rural communities. Mobile subscribers, however, have become more evenly distributed in Africa. In 2000, South Africa accounted

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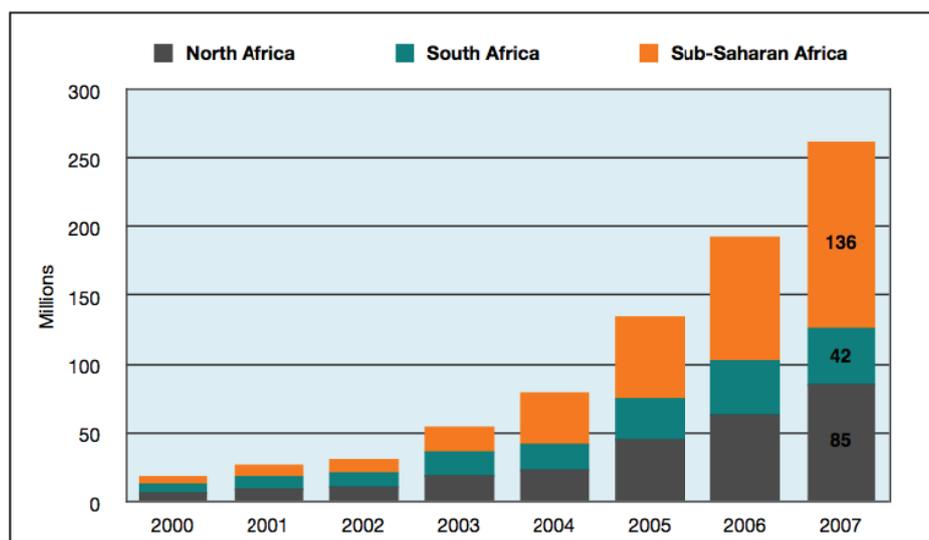
<sup>21</sup> Coyle D, 2005

<sup>22</sup> International Telecommunication Union 2008a: African Telecommunications / ICT Indicators 2008 report, p251

<sup>23</sup> WiMAX is a telecommunications technology that provides for wireless transmission of data in a variety of ways, ranging from point-to-point links to full mobile cellular-type access. Currently Pakistan has the largest WiMAX network in the world.

<sup>24</sup> International Telecommunication Union 2008a: African Telecommunications / ICT Indicators 2008 report

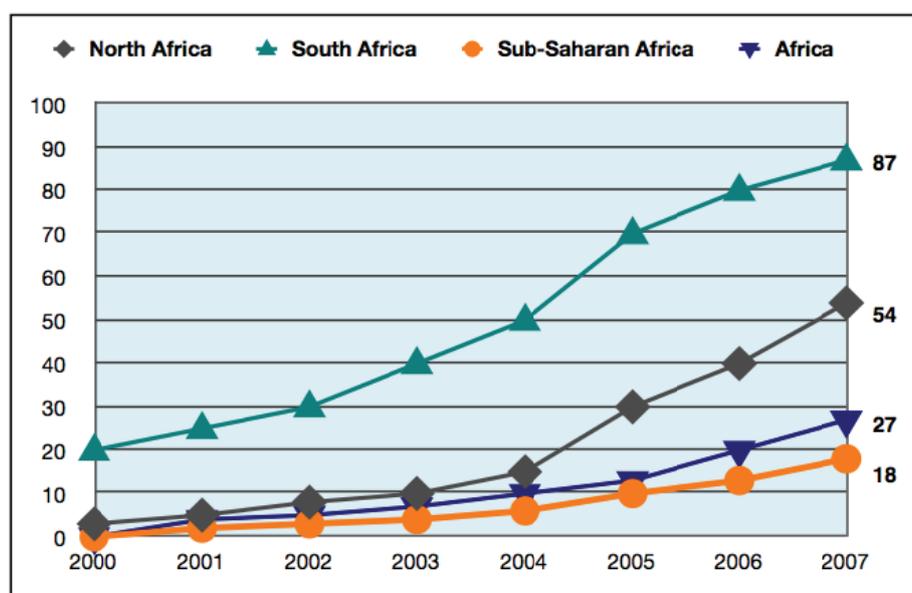
for over half of all of Africa's mobile subscribers, but by 2007, almost 85 percent were in other countries, extending significantly into rural areas, especially in Sub-Saharan Africa (see Graph 1.1).



**Graph 1.1** Mobile subscribers in Africa

(Source: ITU, World Telecommunication/ICT Indicators 2008 Report)

It is clear from Graph 1.2 that the growth of mobile subscribers in Sub-Saharan Africa still represents a relatively low level of penetration. However, if current growth trends are to continue, the levels of penetration should increase rapidly.



**Graph 1.2** Mobile penetration in Africa

(Source: ITU, World Telecommunication/ICT Indicators 2008 Report)

Taking the practice of sharing mobile phones in consideration, it can be argued that the majority of Africans will have access to mobile telecommunication in the nearby future. It is therefore not the personal computer, but the mobile phone that provides the most potential to bridge the *digital divide* between the developed and developing world, the urban and the rural, the rich and poor<sup>25</sup>.

### 1.3 Connecting the Unconnected in African Rural Communities

With several academic studies providing evidence of a strong correlation between an increase in countries' gross domestic product (GDP) and an increase in access to telecommunication, the growth in mobile phone subscription in even the poorest parts of rural Africa is recognized as a force for positive social, economic and environmental change. This provides a convergence of unique opportunities and challenges for the international donor community, developmental agencies, governments, the mobile telecommunication industry and the potential users of mobile telephony.

The lack of coverage, infrastructure, access and knowledge, especially in many rural areas, can leave many people even further behind in an age of *digital development*, unless a concerted effort is made to address it. This has led to initiatives like the World Summit on the Information Society's (WSIS) *Plan of Action* aimed at rural areas in support of the United Nation's Millennium Development Goals<sup>26</sup>. This is particularly relevant to Sub-Saharan Africa where two-thirds of the population reside in rural areas. At the WSIS 2006 the *Connect the World* initiative was launched with the goal of *connecting the unconnected* by 2015.

Providing access to mobile telecommunication services to the rural poor of the developing world requires commitment and resources from the developed world, local governments and mobile operators. The mobile operators have shown their willingness to commit resources and expand into this market because of the high demand and the fact that, even with pervasive poverty, there is profit to be made<sup>27</sup>. At the International Telecommunication Union's (ITU) Connect Africa summit in Kigali in October 2007, the Global System for

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<sup>25</sup> "Calling and end to poverty", *Economist*, 2005, Vol. 376

<sup>26</sup> Developed in September 2000, the eight Millennium Development Goals include (1) the eradication of extreme poverty and hunger; (2) universal primary education; (3) gender equality and empowerment of women; (4) reduction of child mortality; (5) maternal health improvement; (6) combating HIV/AIDS, malaria and other diseases; (7) environmental sustainability; (8) global partnership development (Source: [http://en.wikipedia.org/wiki/Millennium\\_Development\\_Goals](http://en.wikipedia.org/wiki/Millennium_Development_Goals))

<sup>27</sup> Banks & Burge, 2004

Mobile Communication Association (GSMA) announced that mobile operators plan to invest more than US\$50 billion in Sub-Saharan Africa over the next five years to provide more than 90 percent of the population with mobile coverage. Currently there are still about 300 million users in rural areas who are not covered<sup>28</sup>.

Measuring and monitoring progress towards achieving the WSIS goal of connecting the unconnected has proven to be a challenge, since few countries in Africa compile official data on the number of villages. It is often not the number of inhabitants that defines whether a locality is a village, but rather the lack of infrastructure. Urbanization, nomadic populations, civil war and resettlement are all factors that impact the ability to precisely determine how many villages there are in a country. Using recent geo-coded information it could be estimated that there are around 400 000 localities in Sub-Saharan Africa, of which 99 percent are villages<sup>29</sup>.

By the end of 2007, Africa had only 35 million fixed-lines as opposed to 282 million mobile connections. Less than three percent of fixed-lines extended into African rural villages, whereas about 45 percent were covered by a mobile signal by 2006<sup>30</sup>. Some African countries are approaching full universal access or near coverage of all inhabited rural areas with a mobile signal. Countries with a coverage of more than 90 percent, therefore including the rural population and meeting WSIS targets ahead of schedule, includes Comores, Kenya, Malawi, Mauritius, Seychelles, South Africa and Uganda. Countries on their way to meet the target by the end of the decade include Botswana, Burkina Faso, Burundi, Cape Verde, Guinea, Namibia, Rwanda, Senegal, Swaziland and Togo, all of whom already have rural mobile coverage rates of over 50 percent<sup>31</sup>.

Even though coverage increased in rural Africa, there were still at the end of 2007 only an estimated seven percent of rural households that had a subscription to mobile services. This illustrates that increasing mobile telecommunication penetration by simply providing increased access is not enough: the technology and service offering have to be appropriate to this market sector in order to ensure adoption. There is a strong correlation between mobile telecommunication penetration and affordability<sup>32</sup>. The minimum cost of ownership has been

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<sup>28</sup> International Telecommunication Union, 2008b

<sup>29</sup> Market Information and Statistics Unit of the ITU's Development Sector, 2007

<sup>30</sup> Market Information and Statistics Unit of the ITU's Development Sector, 2007

<sup>31</sup> Market Information and Statistics Unit of the ITU's Development Sector, 2007

<sup>32</sup> McKinsey & Company, 2006, p7

found to be the main determinant of the decision to subscribe to a mobile phone service for people living in emerging rural markets. It was estimated that over a billion more people would use mobile phones if they could afford handsets and connectivity. While today's mobile customers in emerging markets typically spend between US\$7 and US\$10 per month on mobile services, providers seeking to access emerging rural markets have to make the mobile offering affordable for people who can spend just US\$2 or US\$3 per month. Mobile access with a total cost of ownership of no more than US\$3 per month is therefore critical<sup>33</sup>.

The issue of affordability has led to a challenge in 2005 from the Global System for Mobile Communication Association (GSMA) to handset manufacturers to design a phone that would cost under U\$30. This challenge was duly met, which prompted a new challenge to halve the price of mobile handsets again to U\$15 by 2008. The market for used phones in developing countries is also helping to drive prices down. The availability of cheaper handsets in combination with innovative ways of selling affordable pay-as-you-go airtime is fuelling mobile expansion among poorer groups. According to Souter et al<sup>34</sup>, these users are currently keeping calling costs to a bare minimum by keeping conversations extremely short, making heavy use of text messaging (SMS) and exploiting *call-back* opportunities.

It is very difficult to measure exactly how many people are making use of mobile phones in rural Africa, because ownership of handsets or subscriptions do not give an accurate perspective. Souter et al<sup>35</sup> argue that an important distinction needs to be made between access to telephony and ownership of phones. Access is available when a public telephone facility can be used within a reasonably convenient distance at a price which is affordable in comparison with the real and opportunity cost of alternatives. These facilities can include public payphones, intermediated payphones and teleshops or telecentres, telephone services provided within retail outlets and the use of privately or communally owned phones. In contrast, private ownership occurs when individuals or households with sufficient income subscribe to a telephone service or in the case of mobile telephony, owns a handset and subscribe to a service provider on either a contract or a prepaid basis.

According to Banks & Burge<sup>36</sup> the key reasons for the historically low uptake of ICTs in developing countries does not only lay in affordability, but also the lack of supporting

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<sup>33</sup> Nokia Siemens Network, 2008

<sup>34</sup> Souter D et al, 2005

<sup>35</sup> Souter D et al, 2005, p32

<sup>36</sup> Banks & Burge, 2004, p13

infrastructure in its predominately rural areas. Logistical problems, such as the vast distances involved, and a lack of financial, political and commercial will, have meant that the expansion of fixed-line networks has been slow or non-existent. Mobile technology, however, can be implemented without the need to run cables over vast distances. An absence of retail channels to support the services (for example the sale of prepaid cards and handsets) and a lack of electricity to recharge mobile phone batteries are all hindering factors. However, these factors are exploited as business opportunities by entrepreneurs. Several mobile service providers have projects where they assist rural micro-entrepreneurs to set up a business providing mobile telecommunication services, ranging from selling prepaid airtime cards to selling the use of a mobile handset on a per call basis. It is also not uncommon to see mobile handset battery recharging offered as a paid service.

Through the concerted efforts of a multitude of players to extend access to rural areas of the developing world, including Africa, mobile phones are able to reach a larger number of people than any other technology. It can be concluded that the evidence of the expansion and uptake of mobile services in rural Africa is adequately significant to provide the requisite network effect for positive economic outcomes.

#### **1.4 The Economic Value of Mobile Telecommunication**

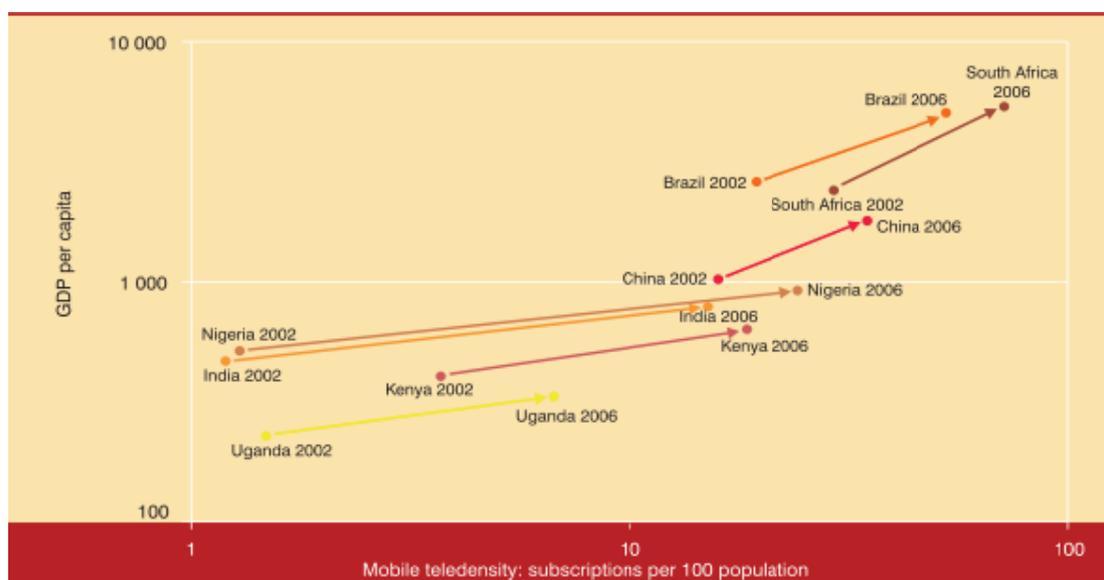
The value that the mobile phone contributes as a communication tool to everyday life in the developing world is not disputed, but increasingly international researchers claim that it also contributes substantial economic value to developing countries and the users themselves. Research by Waverman et al<sup>37</sup> in developing countries found that, if other factors remain constant, 10 percent higher penetration of mobile phone subscribers can translate into a 0.59 percent increase in the gross domestic product (GDP) of a country. It can be predicted that the growth in mobile subscribers in Africa should also have a significant effect on the GDP of this continent's countries as mobile telecommunication penetration is increasing. Roeller & Waverman<sup>38</sup> have shown in their research that the total impact of mobile telephony on a country's GDP is driven primarily by its level of penetration, measured as the number of mobile service subscribers as a percentage of the total population. They ascribed this to the strong network effect of telecommunication where the value of the service increases as the number of subscribers increases and where the biggest economic impact occurs at universal

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<sup>37</sup> Waverman L et al, 2005, p11

<sup>38</sup> Roeller & Waverman, 2001

telecommunication service – a phone in every household and business. Graph 1.3 presents a comparison between the growth of mobile teledensity and GDP per capita in several developing countries, showing that Africa is displaying similar trends.



**Graph 1.3** Mobile teledensity and GDP per capita

(Source: UNCTAD Information Economy Report 2007-2008, summary based on the ITU, World Telecommunication/ICT Indicators database and UNCTAD Globstat database)

Building further on the research of Roeller and Waverman<sup>39</sup>, the McKinsey and Company<sup>40</sup> management consulting group conducted extensive research on the economic impact of the mobile phone or wireless industry in three developing countries, China, India and the Phillipines. This study can provide a basis for assumptions that can be made for similar effects in Africa<sup>41</sup>. The results of this study have been cited in a multitude of popular and scholarly writings to substantiate claims of the positive economic impact that mobile phones have on developing societies. They concluded that estimates frequently understate the overall economic impact of mobile telephony by at least 75 percent, because there are various ways that value is added to societies that is often overlooked. They estimate that the total impact of its benefits can approach 8 percent of a nation's GDP.

<sup>39</sup> Roeller & Waverman, 2001

<sup>40</sup> McKinsey and Company, 2006

<sup>41</sup> As developing countries, Africa shares several characteristics with these countries. They all have very low levels of fixed telephone line communication infrastructure, making mobile telephony people's first access to telecommunication. Rural livelihoods, poverty, illiteracy and a general lack of widespread economic opportunities are common issues for these countries.

McKinsey's researchers define the total economic impact of mobile telephony as the sum of three parts: the direct impact from mobile operators, the indirect impact from other companies in mobile business systems (for example hardware and software vendors, handset vendors), and a second form of indirect impact: the value enjoyed by end users. This value includes improved productivity and business opportunities and the less tangible but valuable benefits of access to information, social networks, social services, improved security, peace of mind, to name a few.

The total impact of wireless communication in the three countries they studied far exceeded expectations. In China, the total economic impact in 2005 was US\$108 billion, representing 5 percent of GDP. Of the total impact only 22 percent was direct whereas 78 percent was indirect. Of the indirect impact 56 percent (US\$47 billion) of GDP contribution was ascribed to other wireless businesses such as equipment and handset makers and 44 percent (US\$37 billion) was value created for end-users. Waverman et al<sup>42</sup> found that the impact of mobile telephony on economic growth in developing countries may be double the growth experienced in developed countries. This growth dividend is larger because here mobile phones mostly provide the main communication networks, thereby supplanting the information-gathering role of fixed-line systems.

Apart from the economic benefits, evidence points to a positive correlation between teledensity and quality of life indicators, allowing for GNP per capita, such as longer life expectancy and lower infant mortality<sup>43</sup>. The amount that consumers are willing to spend on telecommunication services indicates the value that users are attaching to being able to communicate. The average spent on telecommunications in developing countries is 2 percent of monthly household expenditure.

The direct and indirect impact of the growth of the mobile telecommunication industry in Africa has resulted in a new level of local entrepreneurship and job creation. It is reported that by 2008 there has been 10 000 direct jobs created for people employed by mobile phone operators in Nigeria. In addition to the direct jobs created by the mobile operators, the Nigerian Communications Commission placed their estimate of the number of indirect jobs created by the mobile industry in Nigeria, between 2002 and October 2006, at one million<sup>44</sup>.

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<sup>42</sup> Waverman L et al, 2005, p19

<sup>43</sup> Doyle C, 2005

<sup>44</sup> Charles-Iyoha C, 2006

Constituting this population of indirect workers are equipment vendors, advertising and public relations consultants, recharge card distributors, retailers and phone booth operators.

The remarkable point about the job creation figures that are reported across Africa, especially those for indirect jobs, is that they were created without the help of government support. They came into being as the result of private initiatives and it is unlikely that any government's funded job creation efforts have resulted in anything with similar dramatic results. Ewing<sup>45</sup> refers to a *whiff of startup frenzy* as companies spring up to serve the mobile industry, from companies that have grown into multi-national successes to micro-enterprises in rural Africa. In Kenya, where Safaricom lets anyone be an airtime dealer, it is common to see vegetable stands selling bananas, tomatoes and cabbages alongside scratch cards with codes that grant access to additional calling minutes.

Based on the strong positive impact on the economy and the value that is extended to the users, access to mobile telecommunication is increasingly viewed as a social good, rather than a luxury product for the elite few, moving from being a privilege to a right. If the research of Waverman et al<sup>46</sup> and McKinsey<sup>47</sup> regarding the economic effect of mobile phones in developing countries, especially if the higher marginal effects in areas with low levels of fixed-line infrastructure is taken in consideration, then there would be every reason to believe that the economic and social returns will be highest of all in rural areas. This could potentially lead to the socio-economic upliftment of African rural communities.

## 1.5 Research Overview

Supported by the research evidence as described above, this thesis postulates that mobile telephony and its emerging mobile business models is contributing to the sustainability of African rural livelihoods. Validating this postulation will confirm the potential of mobile telephony as a development tool for socio-economic upliftment in rural Africa. Access to mobile telecommunication should consequently be viewed as a social good for *digital democratization*<sup>48</sup>, rather than a luxury product for the elite few, moving from being a privilege to a right.

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<sup>45</sup> Ewing J, 2007

<sup>46</sup> Waverman L et al, 2005

<sup>47</sup> McKinsey & Company, 2006

<sup>48</sup> Banks & Burge, 2004, p17

This postulation can only be endorsed if three conditions are met. *Firstly*, the mobile and related industries have to offer a service or technology that has been truly adapted to the context of rural Africa and its people. If not, it will most likely join the ranks of other failed development projects.

Closely linked is the *second* requirement that the rural African end users of mobile telephony, who mostly have no prior exposure to digital technology, have to claim ownership of it by adopting and embedding it within their lives. Otherwise it will always be seen as an external intervention aimed at the *victims* of poverty, rather than the resilient, creative entrepreneurs that Prahalad<sup>49</sup> refers to.

*Thirdly*, access to mobile telephony has to improve users' livelihoods as an outcome. This is only possible if it reduces their vulnerability by improving their access to resources and providing economic value. The mobile phone can therefore not be merely seen as a communication tool, but it has to provide value in income generating activities. This implies the concept of mobile business models. However, the first world's interpretation of mobile business models cannot simply be applied to rural Africa, since it has followed an entirely different technology development path. The concept of mobile business models will have to be appropriately defined for the African rural context.

The rural African context has to be analyzed in order to establish relevant mobile telecommunication solutions applicable to income generating activities. The Sustainable Livelihoods Framework, widely adopted by development organizations as an analysis framework, will be used for the purpose of establishing the challenges of this context, as well as end users' requirements for appropriate value creation.

The contextual analysis, using the Sustainable Livelihoods Framework, forms the point of departure for this research in Chapter 2. It provides the input for defining mobile business models for the rural African context in Chapter 3. In Chapters 4, 5 and 6 it will be verified if the three identified conditions for success are met. Chapter 4 therefore investigates the multiple players who are active in creating an appropriately adapted mobile business ecosystem. Chapter 5 will be looking at the adoption and appropriation of mobile telephony, while Chapter 6 verifies whether value is created in terms of end users' income generating activities.

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<sup>49</sup> Prahalad CK, 2004

In order to substantiate the validity of the postulation, existing literature and research material was consulted, including quantitative and qualitative sources. Existing case studies also provided a source for investigating the impact of mobile telephony on African rural communities.

## Chapter 2

# Mobile Telecommunication and African Rural Communities

### 2.1 Mobile Telecommunication: a means to an end.

Based on the findings of the McKinsey study<sup>50</sup> on the economic impact of mobile telephony, it can be assumed that the massive growth in the levels of penetration would have contributed to the GDP of Sub-Sahara's growth rate of 4.3% in the period of 2000 to 2005<sup>51</sup>. This contribution would have been mostly made up from the direct and indirect impact from the mobile industry. More difficult to measure would have been the value created for the end users by greater access to telecommunication and the network effect of the increase in subscribers. The McKinsey study places an estimate of this value creation for end users to be in the region of 44 percent of the total impact of mobile telecommunication on the economy. This potential value creation is very significant to the rural poor, since it can have an enormous impact on the sustainability of their rural livelihoods. Hence, many regard mobile phones as an important *tool* for poverty alleviation. This research takes its inspiration from this promise of value creation to end users, leading to the argument that the rapid expansion of mobile telephony in rural Africa can contribute significantly to the access of financial and social capital and therefore sustainable livelihoods for poor rural households.

Technology should however not be seen as a panacea for resolving global poverty, but rather as one of many essential building blocks towards more effective processes and structures to favour the poor. The Organization of Economic Cooperation and Development (OECD) stated in 2003 that mobile phones and other ICTs *should be seen as a means to help meet existing development objectives, in particular the international development goals for poverty*

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<sup>50</sup> McKinsey & Company, 2006

<sup>51</sup> World Bank, 2008, World Development Report

*reduction, education, health and environment, not as a separate sector or an end in themselves*<sup>52</sup>.

McNamara<sup>53</sup> argued that when studying ICTs within the context of poverty alleviation the focus should be on ICTs *as means, not ends, as tools that enable desired changes — in the performance of institutions and markets, in the livelihoods of poor people and the vulnerabilities they face, in the capacity of individuals and governments — since it is these changes, not ICTs, that lead to poverty reduction and sustainable development... ICT-focused measures such as the increase or decrease of the “digital divide” are at best proxies of these deeper changes, and at worst distractions from them.*

Mobile telephony in the context of this research should therefore only be seen as a *means to other ends*: improved livelihoods opportunities for the rural poor. Marine & Blanchard<sup>54</sup> state that the *ends* (sustainable livelihoods) can only be realized if the problem is posed correctly and resolved wisely. The key success factor lies in devising relevant uses for mobile telephony and ICTs in the local context. Only services suited to the local community will satisfy the users, enabling them to use this new communication tool to improve their living standards, through access to new resources to support their livelihood strategies.

According to McNamara, in order to determine whether the technology intervention can address the problem posed appropriately, one should first ask why those ends have not yet been achieved and what the impediments are to their realization. This requires a contextualized analysis of the specific, interdependent causes, challenges and components of rural poverty in Africa; their local environment and external socio-economic, environmental and institutional forces. The Sustainable Livelihoods (SL) Framework, which grows out of this more complex systems perspective, will be used as the reference framework to guide this contextualized analysis. The framework is a systemic representation that embraces multiple dimensions that are interrelated in a dynamic manner<sup>55</sup>. This makes it relevant to analyze the manner in which ICTs and mobile telephony specifically, are used within livelihood strategies to create favourable outcomes for the rural poor. Parkinson and Ramírez<sup>56</sup> argue that the rationale for using the SL framework for ICT-related development issues is that it is

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<sup>52</sup> Banks & Burge, 2004 citing the OECD 2003 report: *Information and Communication Technology for Development*, p20

<sup>53</sup> McNamara KS, 2003, p2

<sup>54</sup> Marine & Blanchard, 2004, p6

<sup>55</sup> Parkinson & Ramírez, 2006

<sup>56</sup> Parkinson & Ramírez, 2006

comprehensive and helps us to think about ICTs in a more *bottom-up* way in terms of who the people are that will be impacted by ICTs, and in what ways.

## 2.2 The Livelihoods Approach

This section will provide a brief overview of the livelihoods approach as well as the Sustainable Livelihoods Framework and its components.

### 2.2.1 The Sustainable Livelihoods Framework

Internationally the Sustainable Livelihoods (SL) approach has been adopted by development organizations, research institutes, NGOs and donor agencies as a framework for multi-level analysis of the challenges, issues and actors that influences the life of the poor. Organizations such as the United Kingdom's Department for International Development (DFID), the United Nations Development Programme (UNDP), OXFAM and CARE have been using this framework as a basis for rural development research and practice. The sustainable livelihoods framework typically comprises the interacting components of livelihood assets, strategies and activities, the vulnerability context, institutional context and outcomes<sup>57</sup>. (See Figure 2.1)

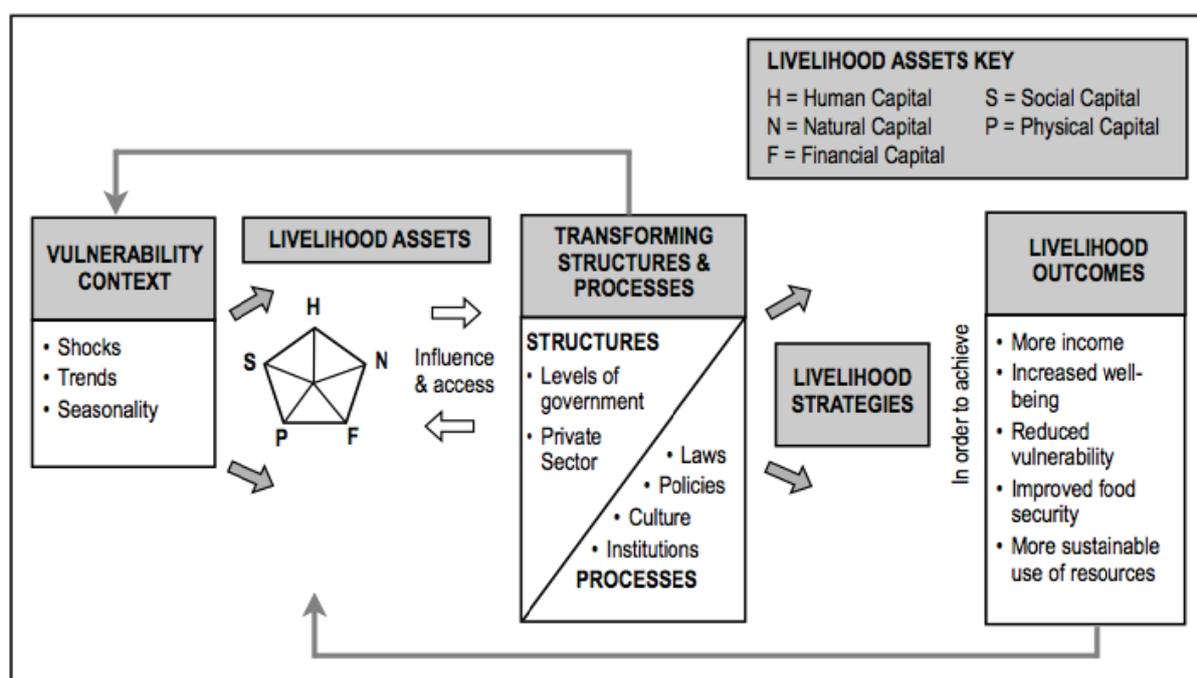


Figure 2.1 - DFID's Sustainable Livelihoods Framework

(Source: Ashley and Carney 1999)

<sup>57</sup> Carney D, 1998, Ellis F, 2000

The livelihoods approach is a way of thinking that is holistic and “bottom up” in that it places people at its center and acknowledges that the poor are not just victims, but exercise their rights in their choices of livelihood strategies. Considering macro and micro issues on poverty, it recognizes multiple causes, multiple influences and multiple strategies for the reduction of poverty<sup>58</sup>. Central to the livelihoods approach is that a balance should be found between the four key dimensions of sustainability: economic, institutional, social and environmental<sup>59</sup>. De Haan & Zoomers quoted Appendini<sup>60</sup> as arguing that the central objective of the livelihoods approach is:

*- to search for more effective methods to support people and communities in ways that are more meaningful to their daily lives and needs, as opposed to ready-made, interventionist instruments.*

As a flexible and evolving framework the livelihoods approach has undergone several revisions and modifications with the emphasis changing according to different applications and interpretations. Carney<sup>61</sup> presented a definition of livelihoods that is widely accepted:

*A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.*

However, Ellis<sup>62</sup> in his definition of a ‘livelihood’ excluded references to capabilities or sustainability and placed more emphasis on the access to assets and activities that is influenced by social relations (gender, class, kin, belief, systems) and institutions. De Haan & Zoomers<sup>63</sup> also recognized the problem of access to livelihood opportunities as a key issue and stated power as an important explanatory variable. Powerlessness is felt most extremely

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<sup>58</sup> Duncombe R, 2007

<sup>59</sup> Ashley & Carney, 1999, p7

<sup>60</sup> De Haan & Zoomers, 2005, p30 citing Appendini 2001, p24

<sup>61</sup> Carney D, 1998, p4

<sup>62</sup> Ellis F, 1998

<sup>63</sup> De Haan & Zoomers, 2005

by the poor because of their lack of political capital<sup>64</sup> which most often cause them to be excluded from opportunities provided through market mechanisms<sup>65</sup>.

## 2.2.2 Components of the Livelihoods Framework

Key components of the SL framework for analysing the livelihoods of communities, households or individuals are their vulnerability context; livelihood strengths or assets; transforming social relations, structures and processes; and livelihood strategies and outcomes, as shown in Figure 2.1.

- **Vulnerability Context**

People's livelihoods and their access and control of resources can be affected by events largely beyond their control: trends, shocks and seasonality concerning economic, political, social, geographical, and natural resource factors<sup>66</sup>. Individuals, families, households or groups create their own coping strategies within a context of vulnerability.

- **Livelihood Strengths and Assets**

Assets are the basis for production, consumption, and investment. An understanding of the asset status of the poor is fundamental to understanding the options open to them, the strategies that they adopt to attain livelihoods, the outcomes they aspire to and the vulnerability context under which they operate<sup>67</sup>. The understanding of livelihoods goes beyond the economic or material objectives of life. Besides conventional assets like land, livestock or equipment, it includes various elements of social and human capital<sup>68</sup>. The livelihoods approach typically distinguishes five categories of assets (or capital) – human, financial, social, physical and natural – often displayed as a pentagon. With the emphasis on the flexible combinations of and trade-offs between different capitals, they should not be viewed as distinct entities, but as interdependent<sup>69</sup>.

*Human capital* can be labour, skills, experience, knowledge, creativity and resourcefulness. *Financial capital* is money in the bank, in credit or a loan or even in a stock. *Social capital* is about the quality of relations between people, about the mutual support that one can rely on

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<sup>64</sup> Duncombe R, 2007

<sup>65</sup> Hulme & Shepherd, 2003

<sup>66</sup> Ashley & Carney, 1999

<sup>67</sup> Ellis F, 1998

<sup>68</sup> De Haan & Zoomers, 2005

<sup>69</sup> Carney D, 1998

from those close to you. *Physical capital* can be food stocks or livestock, tools, farm equipment and machinery, houses and jewellery. *Natural capital* is resources such as land, water, forests, pastures and minerals<sup>70</sup>.

- **Transforming Structures and Processes**

Access, control and use of assets are influenced by the institutional structures and processes such as the market, laws, government policies, trade agreements, societal norms and so forth. Structures and processes form the link between the micro (individual, household, community) and the macro (regional, government, private enterprise) levels<sup>71</sup>. A distinction is made between *processes* that need to change or improve in order to improve livelihoods and *structures*, which are organizations that should implement the poverty eradication interventions<sup>72</sup>.

- **Livelihood Strategies**

The livelihood strategies that people choose reflect their access to assets, the structures and processes that impact on them, tradition and the vulnerability context under which they operate. Livelihood strategies change as the external environment over which people have little control changes. Understanding the diverse and dynamic livelihood strategies is important so that interventions are appropriate<sup>73</sup>.

- **Livelihood Outcomes**

The intention is that through participatory enquiry, an understanding of livelihood outcomes should provide a range of outcomes that will improve well-being and reduce poverty in the broadest sense.

## 2.3 The Livelihoods Approach and African Rural Communities

In the application of the sustainable livelihoods framework for any analysis of sustainable rural livelihoods the key question to be asked, according to Scoones<sup>74</sup>, is:

*Given a particular **context** (of policy setting, politics, history, agroecology and socio-economic conditions), what combination of **livelihood resources** (different types of*

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<sup>70</sup> De Haan L, 2006

<sup>71</sup> Carney D 1998, Ellis F, 1998

<sup>72</sup> De Haan L, 2006

<sup>73</sup> Carney D, 1998, Ellis F, 1998

<sup>74</sup> Scoones I, 1998, p3

*'capital') result in the ability to follow what combination of livelihood strategies (agricultural intensification/extensification, livelihood diversification and migration) with what outcomes? Of particular interest in this framework are the institutional processes (embedded in a matrix of formal and informal institutions and organizations) which mediate the ability to carry out such strategies and achieve (or not) such outcomes.*

Scoones<sup>75</sup> also emphasized that investigating each element laid out in the framework – from contextual factors through livelihood resources to strategies and outcomes – is potentially a significant undertaking and that such exhaustive analysis may not be appropriate in all cases. He states that the principle of *optimal ignorance* must be applied, seeking out only what is necessary to know in order to establish informed development interventions. The framework should act as a checklist and encourage the right questions to be asked when investigating linkages between the various elements influencing both the intervention and the group of people to be affected.

Mobile telephony is an *intervention* that is increasingly seen to have great developmental potential in rural Africa. It is postulated in this research that mobile telephony and its emergent business models can be one of the *means* to the *ends* or outcomes of improved, sustainable livelihoods opportunities for the rural poor. Taking Scoones viewpoints into account, mobile telephony and the related institutions and organizations can therefore potentially *mediate the ability to carry out (livelihood) strategies and achieve such outcomes*. Mobile telephony as an *intervention* is argued to support *livelihood strategies* in terms of facilitating communication, access to information and knowledge, financial transactions and data processing, which in turn should increase access to *livelihood resources*.

In order to investigate this postulation, using the livelihoods framework, the first question that will be investigated in this section will be in terms of the people affected by the *intervention*: what are the conditions and trends within this context that frame this community's *vulnerability*? Looking further at the affected people the second question to be dealt with in this section will be: given the community's *vulnerability*, what are the *livelihood strategies* they are likely to adopt? The identified *livelihood strategies* and intended *livelihood outcomes* will form the reference framework to investigate the potential value that can be added by mobile telecommunication to its end users. The identified *vulnerability*

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<sup>75</sup> Scoones I, 1998, p13

*context* will guide the investigation into the extent to which the mobile telecommunication industry is adapting their offering to be applicable to African rural communities and their local context in order to be able to successfully deliver on their value offering.

### **2.3.1 The Vulnerability Context of African Rural Communities**

With the constant onslaught of events largely beyond their control, African rural communities are living in a constant state of severe vulnerability. An increase in extreme weather conditions caused by climate change, food scarcity accompanied by rocketing consumer prices, the devastation of HIV/AIDS, political upheaval and socio-economic exclusion due to the effects of globalisation are just some of the trends and shocks they have to cope with. The central issue in the context of their vulnerability is pervasive poverty, which has a cyclical, reinforcing effect: because of the levels of poverty, vulnerability increases and because of an increase in vulnerability, poverty increases.

In order to focus a global effort on reducing the vulnerability of at-risk communities worldwide, the United Nations set eight Millennium Development Goals to be achieved by 2015. Achieving these goals remains a challenging task as more than 40 percent of the people in Sub-Saharan Africa still live on less than US\$1 a day. Life expectancy gains have slowed down and in some countries even gone backwards. Poor health and poor schooling hamper productivity. Twenty three African countries are not likely to meet any of the Millennium Development Goals<sup>76</sup>. This means there is no foreseeable reduction in poor communities' vulnerability context in the near future.

- **Rural Poverty**

Rural Communities still make up the majority of Sub-Sahara Africa's population. The 2005 statistics published by the World Bank shows that the rural population as a share of the total population was 64.7% with a 1.4% annual growth rate. This rural population is mostly made up of smallholder peasant farmers<sup>77</sup>. Poverty is concentrated in rural areas<sup>78</sup>, with 51 percent

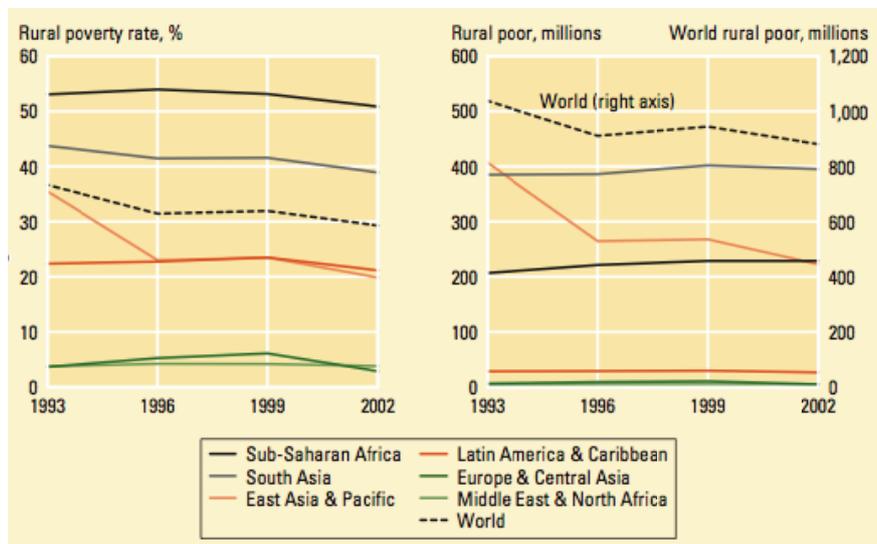
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<sup>76</sup> World Bank, 2008, World Development Report 2008

<sup>77</sup> Peasant farming as opposed to subsistence farming is defined as the combination of subsistence and commodity agricultural production (Bryceson 1999).

<sup>78</sup> Three of every four poor people in developing countries live in rural areas – 2.1 billion living on less than \$2 a day and 880 million on less than \$1 a day – and most depend on agriculture for their livelihoods (*World Bank, World Development Report, 2008, p21*)

of Sub-Saharan Africa's rural communities living under the international poverty line, showing an increase in absolute numbers from 1993<sup>79</sup> (See Graph 2.1).



Graph 2.1 - Rural poverty rate and number of rural poor (US\$1-a-day poverty line)

(Source: World Bank, World Development Report, 2008)

With the average growth in the Sub-Saharan economies for 2005 and 2006 at 5.4%, it appears as if many African economies have turned the corner and are on a path of steady economic growth. However, economic growth in Africa displays greater volatility than in any other region. Periods of growth are often followed by periods of decline, which can be seen in the resultant flattening of economic performance in Africa during 1975 to 2005. Avoiding economic decline is as important as promoting growth and especially for the poor, who do not always benefit from growth and suffer more during decline.

Economic growth is the only way to lift people out of poverty and in most developing countries agriculture is the chief source of national income. It is therefore important that policies and activities are in place that can contribute to a vibrant rural economy in order to reduce income inequalities<sup>80</sup>. However, macro-economic policies set in place by the World Bank in the last three decades have detracted from the African rural economy and contributed further to the vulnerability of these communities. It is exacerbated by globalization, which is leading to increased economic exclusion of rural peasant communities<sup>81</sup>.

<sup>79</sup> World Bank, 2008, World Development Report 2008

<sup>80</sup> World Bank, 2008 World Development Report 2008

<sup>81</sup> Havnevik K et al, 2007

- **Globalization and the African Rural Community**

Internationally, scholars and developmental economists blame the World Bank's policies and involvement in agriculture for the devastating consequences suffered by rural communities in developing countries and particularly in Africa<sup>82</sup>. The World Bank's policies are criticized for exacerbating and entrenching the vulnerability of rural communities. In their review of the World Development Report 2008 for the Nordic Africa Institute, Havnevik et al<sup>83</sup> states:

*Consistently World Bank agricultural policies have displayed contradictory tendencies and a glaring discrepancy between stated objectives and actual outcomes. Nonetheless, the World Bank has rarely been held to account. Peasant farmers have been too dispersed and without a voice whereas heavily indebted African governments are too dependent on the World Bank's conditional aid to criticize the policies it enforces.*

Through the 1970s the World Bank supported agriculture in Africa by building public institutions that could support farmers through extensions, credit and marketing. Paradoxically, these marketing boards were targeted and eradicated in the 1980s by the Bank's Structural Adjustment Programmes (SAPs) which were *aimed at getting the fundamentals right*. However, SAPs were too narrowly focused on macroeconomics and did not pay sufficient attention to the often-adverse consequences of the proposed adjustment measures for the poor<sup>84</sup>. Following the debt crisis of the 1970s and 1980s most governments in the Global South had no choice but to borrow money from the World Bank and to adhere to its imposed conditions. This meant reductions in government social spending, the dismantling of support mechanisms to assist the poor and a simultaneous opening of markets to foreign capital, corporations and imports. Reduced government spending on infrastructure like telecommunication, roads and electricity exacerbated the isolation of rural communities.

According to the Sustainable Livelihoods approach institutional structures and processes such as the government policies and trade agreements influence access, control and use of assets (capital). It is apparent in the unfolding of events that the macro level policy decisions to enter into skewed trade agreements and to remove the support structures, like the marketing boards, had severe consequences for the livelihoods of African rural communities and their access to assets (physical and financial capital). It led to widespread unemployment and

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<sup>82</sup> Patel R, 2007

<sup>83</sup> Havnevik et al 2007, p11

<sup>84</sup> De Haan L, 2006

spikes in poverty rates, but the effect on agriculture was particularly devastating<sup>85</sup>. Local rural economies were radically restructured with agricultural production orientated towards an international commodity market historically dominated by large-scale modern, sometimes heavily subsidized, North American and Western European producers<sup>86</sup>.

Removing all agricultural subsidies to rural peasant farmers meant that poor farmers lacked the capital for fertilizers, seeds and irrigation, leading to low levels of agricultural productivity and resource degradation<sup>87</sup>. The Green Revolution contributed enormously in Southeast Asia and Latin America to boost agricultural productivity and degradation of resources<sup>88</sup> and provided economic opportunities and a measure of security for peasant farmers. However, Africa did not see the benefits of its own embryonic Green Revolution that was initiated in the 1970s since it was short circuited by the *tightening of belts* enforced by the Structural Adjustment and economic liberization policies<sup>89</sup>. Thereafter the Green Revolution benefited only those farmers who could afford the technology (seeds, fertilizer and irrigation), at the expense of poor farmers who could not. This led to increased landlessness as poor farmers became indebted and lost their holdings, increased migration to the cities and the paradox of increased hunger. Today, Sub-Saharan Africa is the only place in the world where there is less food per person year after year.

Contributing further to the vulnerability of African rural communities are the World Trade Organization's (WTO) Economic Partnership Agreements. With a pure market approach, the Agreements on Agriculture attempt to lower market barriers, domestic support and export subsidies in order to ensure free trade and food security for all. However, *free trade* is viewed as one-sided and at the expense of the world's poor<sup>90</sup>. Studies show that smaller farms, producing for local markets, take better care of the environment, are more efficient and productive while generating more employment. Yet, peasants are forced out of agriculture by industrialized, commercial estates with access to non-agricultural capital. Peasant farmers

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<sup>85</sup> Patel R, 2007

<sup>86</sup> Havnevik K et al, 2007, Nhampossa D, 2007

<sup>87</sup> Havnevik K et al 2007

<sup>88</sup> India saw annual wheat production rise from 10 million ton in the 1960s to 73 million in 2006 (*Source: BBC News, 2006, The End of India's Green Revolution?*)

<sup>89</sup> Havnevik K et al 2007

<sup>90</sup> Farmers from the developed world are still subsidized by their government in the region of \$1 billion a day, which is approximately six times the amount they spend on development assistance (*Havnevik 2007*). The World Bank's Official Development Assistance (ODA) destined for agriculture has been declining steadily from \$6.7 billion in 1984 to \$2.7 billion in 2002 (*Patel 2007*).

cannot compete in the high risk, low return environment created by current policies. They are loosing their livelihoods, source of employment and food security.

Having placed agriculture afresh back on its development agenda, the World Bank's World Development Report (WDR) 2008 states that today's agriculture offers new opportunities to hundreds of millions of rural poor to move out of poverty. However, it paradoxically also stresses that liberalized international markets will remain the primary force for achieving productivity increases and poverty alleviation<sup>91</sup>, yet again seeming not to take into account the consequences that these market forces thus far had at the micro level on livelihoods. Havenik et al<sup>92</sup> argues that, through their policies and in the name of development, the World Bank is with impunity throwing their weight behind this rapid redundancy of peasant smallholders:

*The World Bank adopts a matter-of-fact position that they<sup>93</sup> will relinquish their autonomy as agricultural producers and work as contract farmers or wage laborers in large-scale agribusiness or alternatively leave agriculture to seek their livelihood elsewhere. Their sanguine attitude towards peasant labour redundancy does not tally with their professed concern for the African rural poor. Beneath the WDR 2008's public relations spin about poverty alleviation, they are conferring carte blanche support to a 'survival of the fittest' economic trajectory in which the grossly imbalanced commercial interests of large-scale OECD subsidized farmers, supermarket chains and agri-business have full scope to compete against unsubsidized peasant farmers engaged in rural ways of life that have managed hitherto to endure for millennia<sup>94</sup>.*

Having suffered three decades of agricultural decline, African peasant smallholders can no longer compete successfully in international commodity markets. Unless the playing fields are leveled, it is market fundamentalism on the rampage, which assaults the cultural and economic bedrock of African nation-states – their agrarian roots.

- **The Depeasantization of the African Rural Community**

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<sup>91</sup> World Bank 2008, World Development Report 2008, p21

<sup>92</sup> Havenik K et al, 2007

<sup>93</sup> Smallholder Peasant Farmers

<sup>94</sup> Havenik K et al, 2007, p58

Depeasantization has happened time and again in the last three hundred years of world history in one country after another. Given this fact of history and the extreme vulnerability context as described above, which does not show any promise of dissipating in the near future, the question should be asked why it is deemed as important that the African rural way of life should remain sustainable as opposed to allowing depeasantization to take its course. Mobile communication's role in the sustainability of African rural livelihoods can only be deemed important if the sustainability of African rural communities is important.

Depeasantization is already underway in rural Africa and it can deliver positive long-term outcomes in terms of higher paid labour pursuits and new fulfilling ways of life, providing that the opportunities to do so exist. According to Havenevik et al<sup>95</sup> the consequences of African depeasantization is different from most parts of the world that have undergone the same process because it has not experienced an agricultural revolution to lift its agricultural productivity, nor is it undergoing an industrial revolution to raise its non-agrarian productivity. Unlike the rapid depeasantization process currently underway in China, the African depeasantization is not occurring concurrent to booming industrial and service sectors of the national economy, which means an absence of the required labour market to absorb people. That is why there is still such a strong persistence of peasant subsistence farming. Rural African households inevitably still depend heavily on the agricultural sector for much of their income, either through retained output, sale of their own crops or livestock, or wage labour on others' farms<sup>96</sup>.

Even though rapid urbanization is occurring, strong links are always kept with the rural community of origin with a complex system of cyclical or reciprocal migration between rural and urban areas being the order of the day. In the context of food insecurity remittance exchanged is two-way with income often sent to rural areas and food sent to urban migrants<sup>97</sup>.

The research findings of the Leiden University's programme on De-Agrarianization and Rural Employment (DARE) suggest that material reliance on own-farm agricultural produce and the moral values associated with agricultural production remains an ever-present strong factor, even for those who are urban-oriented or non-agriculturally dependent<sup>98</sup>. Subsistence

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<sup>95</sup> Havenik K et al, 2007

<sup>96</sup> Barret CB et al, 2001

<sup>97</sup> Johnson H, 2004

<sup>98</sup> Bryceson DF, 1999a

production represents a vital safety net in that it provides some degree of food security and affirms community-held agrarian values. Continued food price inflation and proliferating cash needs underscore the importance of food self-provisioning. It is therefore vital that rural dwellers' long-term prospects of seeking sustainable rural livelihoods should be ensured.

As the African rural community's external environment changes, livelihood strategies are adapted. Having explored their vulnerability context linked to this changing external environment, it is important to identify and understand emerging and dominant livelihood strategies in order to determine the contribution that mobile telecommunication can make in ensuring sustainable rural livelihoods.

### 2.3.2 Livelihood Strategies

Scoones<sup>99</sup> identifies three types of rural livelihood strategies: agricultural intensification or extensification, livelihood diversification (including both paid employment and rural enterprises), and migration (including income generation and remittances). Barret et al<sup>100</sup> classifies the associated activities broadly as agricultural and non-agricultural activities, whereas some activities cut across both sectors. Income derived from these activities can then be classified as either agricultural or non-agricultural income.

- **Agricultural Intensification or Extensification**

It has been established through the investigation of the vulnerability context of African rural communities that agricultural intensification or extensification, as the only source of income, can only be an appropriate rural livelihood strategy for those with the required capital to compete globally. These are either agri-business or the *rich farmers* as described by Bernstein<sup>101</sup> in his postulation of a differentiation within the peasant population. He identifies three categories in rural populations: the *poor*, the *middle*, and the *rich* farmer. The rich farmers, according to him, accumulate sufficient capital to invest in production through the purchase of superior means of production or additional labour. He sees rich farmers' success in becoming capitalist farmers as another form of depeasantization.

Contract farming is an option for smallholder farmers, however it is selective in its outreach in that it is often restricted to locations near big cities or major roads<sup>102</sup>. The poor depend on

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<sup>99</sup> Scoones I, 1998, p9

<sup>100</sup> Barret CB et al, 2001

<sup>101</sup> Bernstein H, 2003, p5

<sup>102</sup> Havnevik et al, 2007

the output of their agricultural production for their own consumption, leaving them with no or very little surplus for trading in local markets and *pushing* them into income diversification activities to supplement their agricultural income<sup>103</sup>.

Income derived from agricultural activities, such as retained output or the sale of own crops or livestock, will be classified for the purposes of this research as *agricultural income streams*. Rural African households inevitably still depend heavily on the agricultural sector for much of their income.

- **Livelihood Diversification**

Bryceson<sup>104</sup> argues that income diversification is biased towards non-agricultural activities and caters to local and national, rather than international, markets. Ellis<sup>105</sup> distinguished between *pull* and *push* that necessitate diversification. Pull factors are incentives that provide households with the opportunity to diversify their income earning potential by taking advantage of business opportunities. Rich peasants frequently pursue diversified accumulation strategies ranging from crop trading and processing, money lending, rural transport and tractor renting to village shops and bars<sup>106</sup>. Push factors however, are constraints that leave a household no other choice than to diversify in response to desperate circumstances where income from only one or two activities is insufficient to meet daily needs and diversification is required as rational risk management.

For the African smallholder agriculture is no longer an economically viable activity. The constant threats to their agricultural means of production are the *push* factors that force them to look for income diversification as survival strategy<sup>107</sup>. Unable to produce enough within the household production to survive, *poor* farmers regularly have to find agricultural or non-agricultural waged employment<sup>108</sup>. The deluge of farmers exiting the smallholder sector and flooding rural labour markets are often met with extremely low returns and harsh working conditions. There is very little security of employment as casualization of agricultural wage labour is a common tendency<sup>109</sup>.

The *middle* farmers in Bernstein's classification are those who manage to produce enough for

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<sup>103</sup> Barret CB et al, 2001

<sup>104</sup> Bryceson DF, 1999a

<sup>105</sup> Ellis F, 1998

<sup>106</sup> Bernstein H, 2001

<sup>107</sup> Bryceson DF, 1999b

<sup>108</sup> Bernstein H, 2001

<sup>109</sup> Havnevik K et al, 2007

themselves mainly through family labour on family land, but only in specific relations to other forms of production. These are the households who diversify their incomes and differentiate within themselves, with some family members often migrating in search of wage labour. Bernstein argues that peasantry persists in this category.

Diversification into rural non-agricultural activities is performed primarily on the basis of self-employment in areas like small-scale trade, the cottage industry, artisan work and services. The risks are high with a lack of skills, financial capital and over-supply forming the over-riding constraints<sup>110</sup>. The rural informal sector is already heavily over-subscribed and known for its low, unreliable fluctuating levels of remuneration, making this an unattractive option for *poor* farmers who do not have the means to absorb risk.

For the *middle* farmer the capital required to invest in non-agricultural activities is based on savings from agricultural activities or wage labour. A pattern of cross-investment is seen, as capital invested in farms is often derived from earnings through non-agricultural activities. One of the reasons for these cross-investment patterns is that African rural areas' access to banks are often poor and the available banks are not geared to serve people with limited savings. Micro-enterprises therefore often represent the most attractive investment option for savings and post harvest incomes. By combining agricultural production and trade it is possible to increase one's income by recirculating the same capital several times a year<sup>111</sup>.

Wealthy rural households with more access to capital can invest in the most capital intensive and highest earning non-agricultural activities, increasing income differences. Bryceson<sup>112</sup> pointed out that evidence shows income diversification to be a far more successful strategy for wealthier households, whereas others have to 'make do' in a severely deficient market environment. Barret et al<sup>113</sup> also observed that financial constraints not only impede some forms of diversification, but can restrict diversification to low-return activities.

Income derived from non-agricultural activities pursued in livelihood diversification will be classified for the purposes of this research as *non-agricultural income streams*. Income streams to be investigated will be those derived from waged labour and micro-enterprises. This will be further extended to include remittances received from household members who migrated.

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<sup>110</sup> Havnevik K et al, 2007

<sup>111</sup> Pederson PO, 2001, p6

<sup>112</sup> Bryceson DF, 1999a

<sup>113</sup> Barrett CB et al, 2001

- **Migration**

The third type of rural livelihood strategy identified by Scoones<sup>114</sup> is the option to migrate to an urban area to seek employment. The motive for migration is not profit or accumulation; it is survival. In most cases the outcome of migration is very similar to that of participating in rural non-farm activities without the safety net of having farming members of the family nearby<sup>115</sup>. Rural households seldom migrate as a unit, but rather differentiate, maintaining close social and economic connections and exchanging remittances. These households are sometimes referred to as ‘*multi-spatial households*’ where income-generating activities are performed in different geographical areas but the household still consider themselves as a single a unit<sup>116</sup>.

Migration in Sub-Saharan Africa has traditionally not been restricted to the various countries’ own urban centres, but has always gone beyond national borders. As the development of modern communication and transport technologies made the flow of goods and people easier, labour migration from the developing world to the developed world has increased<sup>117</sup>. This is especially apparent in the striking increase in international remittance flows over the past few years. According to a study by De Haas<sup>118</sup> remittances sent back to developing countries rose from \$31.1 billion in 1990 to \$167.0 billion in 2005, representing over twice the amount of official development assistance.

De Haas cites a study by Lindley<sup>119</sup> in Hargeisa, Somalia, which shows that over half of the households surveyed were entirely reliant on remittances. He cites another study by Nwajiuba<sup>120</sup> in southeast Nigeria that concludes that the contribution of those who migrate outside of the African continent may be up to fifty percent of household income. De Haas argues that apart from their direct economic consequences, remittances also have non-pecuniary consequences on a wide range of societal issues such as an impact on health, education, gender, care arrangements and social structures. With reference to *Livelihood Strengths and Assets* in the Sustainable Livelihoods Framework, remittances can therefore be seen to not only contribute to financial capital, but also human and social capital.

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<sup>114</sup> Scoones I, 1998

<sup>115</sup> Havnevik K et al, 2007

<sup>116</sup> Bryceson DF, 1999a, p19

<sup>117</sup> Johnson H, 2004

<sup>118</sup> De Haas H, 2007

<sup>119</sup> De Haas H, 2007, p8, citing Lindley, 2006

<sup>120</sup> De Haas H, 2007, p8, citing Nwajiuba, 2005

## 2.4 The Role of Mobile Telecommunication in Sustainable Livelihoods

Within the Sustainable Livelihoods Framework *assets* are the *livelihood resources* which provide the basis for production, consumption, and investment. It is interrelated to the strategies adopted to attain livelihoods, desired outcomes and the vulnerability context<sup>121</sup>. Livelihood outcomes as a result of livelihood strategies should not be limited to income growth because social and economic dimensions are fundamentally interrelated. The wellbeing, social relations, and human capital of people also affect their productivity, capacity for income generation and freedom of choice. Sen<sup>122</sup> argues that livelihood outcomes must add to the quality of people's lives, therefore enhancing the ability of human beings to lead lives they value. Peoples' capabilities to control their own lives have to be expanded.

It is argued that, given the vulnerability context and the livelihood strategies previously described for African rural communities, mobile telephony can contribute to an increase in the access to the livelihood resources, especially financial, human and social capital. It can help to leverage these assets in transformative ways to improve people's lives and add to the quality of their lives. Mobile telephony can facilitate transactions, data processing, communication and access to information and knowledge in rural Africa, which in turn enhances access to livelihood assets and people's capabilities in terms of livelihood strategies.

Without these facilitating structures and processes in place, the rural communities are deprived of basic resources. They lack access to information and knowledge about income-earning opportunities. They do not have access to information that is vital to their lives and livelihoods: information about market prices for the goods they produce, about health, their rights, and about public institutions. They often lack access to markets and institutions that might provide them with needed resources and services. They lack knowledge and education. They could greatly benefit from information on better choice of food, safe water and basic

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<sup>121</sup> Ellis F, 1998

<sup>122</sup> Sen A, 1999

nutrition, childcare, family planning, immunization, prevention and control of endemic diseases<sup>123</sup>.

Marker et al states that *information, knowledge and communication are the lifeblood of economic and social interaction*<sup>124</sup>. In societies where information flows widely and access to communication services are widespread, markets and government institutions are likely to become more transparent, accountable and efficient. While information, knowledge and communication are not explicitly acknowledged in the livelihood frameworks (they could be seen as implicit to human, social and physical assets), Souter et al<sup>125</sup> also see these to be crucial factors in people's ability to develop appropriate and sustainable livelihoods strategies.

Increasing the flow of information, communication and knowledge is a critical component of sustainable development and poverty reduction in that it contributes directly to *human capital* and indirectly to *financial capital* due to improved risk management and access to markets. The ability to communicate strengthens social networks and therefore *social capital*. Social capital is the capital of the poor<sup>126</sup>. According to social capital theory social interaction between communities and institutions shape economic performance. As interrelated factors, an increase in financial, human and social capital should strengthen the livelihood resources of African rural communities and lead to income growth and a better quality of life.

To the astonishment of the industry, people living on a few dollars a day have proven to be avid phone users, for the simple reason that a mobile phone can dramatically improve living standards by saving wasted trips, providing information about crop prices, summoning medical help, and even provide access to banking services<sup>127</sup>. There is plentiful anecdotal evidence to confirm this, as well as a growing body of documented research as people are increasingly taking notice of the phenomenal impact of this disruptive technology<sup>128</sup>.

Several authors have written extensively about ICTs, and telecommunication specifically, as tools for economic development through facilitating the flow of information, communication

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<sup>123</sup> McNamara KS, 2003

<sup>124</sup> Marker P et al, 2002 p8

<sup>125</sup> Souter D et al, 2006

<sup>126</sup> Woolcock & Naryan, 2000

<sup>127</sup> Ewing J, 2007

<sup>128</sup> *Disruptive technology* is a new technology that has a serious impact on the status quo, changing the way people have been doing things. Source: <http://www.techweb.com/encyclopedia/>

and knowledge. In an overview of their studies from the academic and development communities, Saunders et al<sup>129</sup> concluded that telecommunication contributes to economic development by providing better market information; improved transport efficiency and more distributed economic development; reduced isolation and increased security for villages, organizations and people; and increased connectivity to international economic activity.

Saunders et al's conclusions, which pre-dates the mobile telephony boom in the developing world, are confirmed by later studies by Eggleston et al<sup>130</sup>. According to them information and communication are valuable commodities that can enhance the functioning of markets critical for the well-being of the poor. Their research concludes that greater access to ICTs, starting with basic communication infrastructure, could significantly improve the living standards of the world's rural poor by enhancing the functioning of relevant markets. Enhancing earning possibilities is the only sustainable way to end poverty, using the '*invisible hand of the market as a helping hand to the world's poor*'<sup>131</sup>. Appropriately designed ICTs, with the emphasis on the *Information* and *Communication* components of ICT, can help doing exactly this. They argue that ICTs can create a *Digital Provide* (see Figure 2.3) that boosts incomes and ultimately leads to economic growth.

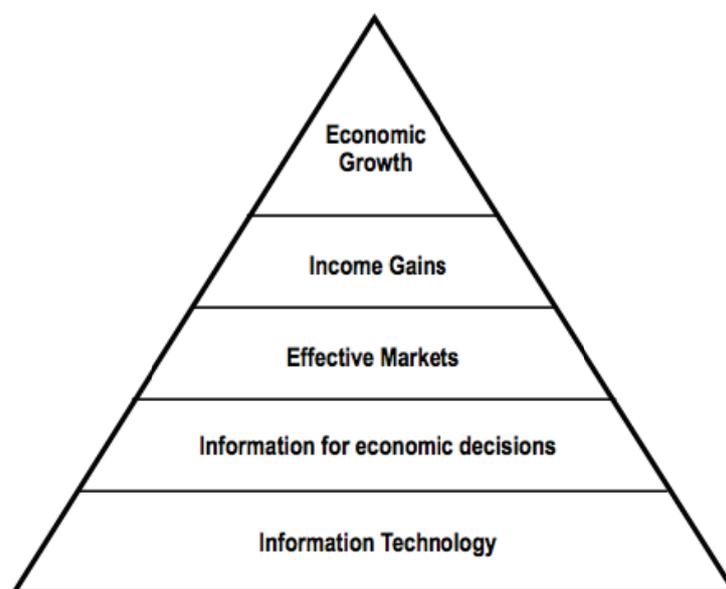


Figure 2.3 - The Digital Provide  
(Source: Eggleston et al, 2002)

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<sup>129</sup> Saunders RJ et al, 1994

<sup>130</sup> Egglestone et al, 2002

<sup>131</sup> Egglestone K et al, 2002, p10

Information can be disseminated to isolated, information-deprived rural communities using ICTs. The rural producers and consumers who receive this information will, for perhaps the first time, be able to participate in effective markets. The immediate consequence should be income gains for participants, as well as the ability to spend their incomes better. In time, enhanced access to information should enable producers to significantly improve their practices, leading to economic growth.

Heeks & Jagun<sup>132</sup> take the discourse of the benefits that mobile telephony brings to rural communities beyond access to markets. They classify the benefits to African rural communities of being able to communicate and receive information via mobile telephony as *incremental*, *transformational* and *production benefits*. According to Heeks & Jagun *incremental benefits* improve what people already do. An incremental benefit seen in rural Africa is that mobile telephony offers users cheaper and faster communication, often substituting risky and costly journeys. They see *transformational benefits* to offer something new: new ways to access information and other services that can support livelihoods because the mobile phone's features allow it to be something more than just a phone. Mobile phone services let fishermen and farmers check prices in different markets before selling produce, make it easier for people to find work, allow quick and easy transfers of funds and boosts entrepreneurship. *Production benefits* arise from selling mobiles and related services like re-selling airtime, prepay cards or even battery charging services.

With its increasing footprint, mobile phones provide the primary technology for access to information; communication and knowledge in rural Africa and can play an important role in supporting livelihood strategies and its associated income streams, contributing to a vibrant rural economy at a local level. This makes mobile telecommunication a valuable development tool.

## **2.5 Mobile Telephony as a Development Tool**

Proof of the value of mobile telephony as a development tool is apparent in the well-documented socio-economic upliftment experienced by rural communities in Bangladesh, which share some similarities with rural African communities in terms of the prevalent levels of economic disempowerment. As a developing country, mobile innovation in the Philippines

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<sup>132</sup> Heeks & Jagun, 2007

also offer important insights into increasing access to financial services and economic opportunities, not only for the wealthiest in society but also for poorer segments of society. In both of these countries the mobile telecommunication industry has developed very successful mobile business models that has been proven to contribute to the livelihoods of rural communities.

One of the greatest success stories in international development has been Grameen's Village Phone Program (VPP)<sup>133</sup> in Bangladesh that improved the living standards for large numbers of people by integrating entrepreneurship, microfinance and mobile communication. In rural villages where no telecommunication services have previously existed, mobile phones are provided to very poor women who use it to operate as a business. Micro-entrepreneurs, mostly women, who have proven their ability to work and repay loans, purchase the phone with a micro loan from Grameen Bank and then sell the use of it on a per call basis. The typical *village phone lady* has an average income three times the national average.

The benefits to the community have also been tremendous. Through this telecommunications service rural individuals can gain access to information that increases their productivity, earns better prices for the goods they produce, saves on the direct opportunity costs of traveling away from home and access numerous services provided by government and non-government organizations<sup>134</sup>. Mobile telephony has added \$650 million to Bangladesh's gross domestic product (GDP) and Grameen Phone's Village Phone is given a lot of the credit for this growth<sup>135</sup>. Because of the program's success in Bangladesh, the Grameen foundation has replicated the model in two African countries, Uganda and Rwanda.

The transformation of society by mobile telephony has also been profound in the Philippines. They have become a global leader in mobile commerce (m-Commerce)<sup>136</sup>. Ranked as the most SMS (short message service) intensive country in the world, the use of SMS as a means of conducting m-Commerce originated in the Philippines<sup>137</sup>. It started with passing *top off* credits among subscribers in exchange for services. The development of *mobile currencies* like G-Cash and Smart Money are now used for more formal financial services like micro-finance. In an effort to reach the poorest of the market, services are offered like 'Ask-a-Load'

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<sup>133</sup> Charles-Iyoha C, 2006

<sup>134</sup> Keogh & Wood, 2005

<sup>135</sup> Lane B et al, 2006

<sup>136</sup> Mobile commerce involves the storage, payment, receiving and sending of *electronic currency* through the use of mobile phones. (Mendes S et al, 2007)

<sup>137</sup> Mendes S et al, 2007

which allows a subscriber to literally request via SMS a particular amount of credit from another subscriber, which the latter can then choose to approve or disapprove. In this regard, the exchange of mobile credits, or 'loads', has become a de facto form of micro finance. As large numbers of Filipinos work abroad as migrant laborers, international remittance services are another very successful m-Commerce offering with almost U\$50 million remitted in 2006 through one such offering, Smart Money. Providing mobile-enabled financial services, or mobile banking, addressed an enormous service gap that exists in most developing countries, including rural Africa.

The increase in mobile density in rural Africa has led to an explosion in innovation of mobile services and applications in support of these previously disconnected communities. Mobile business models similar to the Village Phone Program and m-Commerce services offered in the Philippines are already available in Africa. Utilizing the wireless network for transactions, communication, information, collaboration, and cooperation rural communities are able to use these services and applications to support their livelihood strategies.

Mobile business models are emerging at a rapid rate on a micro and macro level, either through innovation at a user level, development and aid agencies or by industries that are increasingly aware of business opportunities at the *Bottom of the Pyramid*<sup>138</sup>. Prahalad argues that market development at the *Bottom of the Pyramid* will create millions of new entrepreneurs at the grass roots level. He suggests that we should stop thinking of the poor as victims or as a burden and start recognizing them as resilient and creative entrepreneurs and value-conscious consumers. Mobile telephony and its emergent business models (m-Business) can facilitate market development at the grass root level. Gellner<sup>139</sup> stated:

*Once a powerful technology exists and is known to exist, a productively powerful society without much of a market also becomes possible. Whether it then inevitably engenders a hidden market (the double economy), or networks of reciprocity, is an interesting question.*

The following chapter will investigate the concepts of mobile business models further and reframe it in an appropriate definition for African rural communities.

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<sup>138</sup> Prahalad CK, 2004

<sup>139</sup> Gellner E, 1990, p181

# *Chapter 3*

## The Emergence of Mobile Business Models in African Rural Communities

### 3.1 Mobile Business (m-Business) defined

Camponovo & Pigneur<sup>140</sup> comment that the m-business landscape never stops to change and the impacts on the mobile market are constant as players reposition themselves according to the new opportunities and threats brought by rapid technological developments. Due to these ongoing shifts and complexities of emergent mobile technology, it is characterized by a large number of uncertainties at different levels concerning technology, demand and strategy, since there are *no laid down rules of the game*<sup>141</sup>. This is especially true for the growth of the m-business landscape within developing countries. The complexities of this market terrain present enormous risks and challenges for players wishing to enter this market. However, the implemented solutions can provide the end users as well as the implementers with spectacular outcomes.

Even though the recent phenomenon of the mobile telecommunication explosion in Africa is well researched and documented and some of its applications extensively described, it has proved to be a very difficult task to find literature defining mobile business (m-business) per se within a rural African context. The majority of literature on the field of m-business is within the context of the information and knowledge society of the developed world where ICT is pervasive. Within that context m-business emerged in an environment where telecommunication is a given, due to widespread fixed line infrastructure, and electronic business is already well entrenched in all modes of production. In this environment m-business is often very simply characterized as an extension of e-business. However, it is not the case in rural Africa where mobile communication is mostly the only option to communicate, due to a dearth of fixed line infrastructure. Here m-business is emerging *in*

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<sup>140</sup> Camponovo G & Pigneur Y, 2002

<sup>141</sup> Camponovo G & Pigneur Y, 2003, p1

*place of* rather than *in addition to* e-business. Defining m-business in this context has to take cognizance of these differentiating factors, as rural Africa and other similar developing communities are pioneering relevant mobile business models in response to their context. This is not to say that current literature available on the subject of m-business is not of value to this research; indeed, research within a more mature adoption market provides constructive insights in defining mobile business within the rural African context.

*Mobile business* (m-business) is a buzzword that is used in many different ways. Many definitions of m-business focus on enabling business transactions through wireless devices, confusing mobile business with mobile commerce. However, as an industry that enables the convergence of the Internet, e-business and the wireless world, m-business is much more than mobile transactions. Kalakota & Robinson<sup>142</sup> define m-business as *the application infrastructure required to maintain business relationships and sell information, services, and commodities by means of the mobile devices.*

In the networked, global village e-business is increasingly becoming *business as usual* as suppliers, distributors, service providers, infrastructure providers, and customers use the Internet as the basis for business communications and transactions, creating business webs. Business models based on networks are the key to competitiveness and wealth creation in today's global, digital economy where successful companies move from traditional applications to the new breed of integrated, e-business application architectures<sup>143</sup>. While the Internet is transforming traditional business to electronic business (e-business), wireless technology is enabling business to move even further to m-business. However, m-business is not just limited e-business functions available on mobile phones, laptops, and PDAs, but offers functions and applications that e-business has limited success in delivering.

M-business is distinct from e-business in that m-business builds its value proposition on the distinctive advantage of mobility provided by wireless technology. In the absence of fixed-line telecommunication networks in rural Africa, mobile phones are foremost valued as representing the communication infrastructure it has previously lacked. Mobility is therefore not necessarily the primary value proposition, but nevertheless remain a benefit that can be exploited for applications appropriate to rural Africa.

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<sup>142</sup> Kalakota R & Robinson M, 2001

<sup>143</sup> Kalakota R & Robinson M, 2000

While mobility itself offers tremendous value, there are several other aspects that promise to make business processes more efficient and effective, and create a more personalized approach to information access, decision-making, and communication than traditional wired environments. Junglas & Watson<sup>144</sup> identified these aspects to include connectivity, accessibility, reach-ability, localization and ubiquity.

*Connectivity* is one of the fundamental aspects of mobile technology. It refers to the ability to connect users to machines (U2M), machines to machines (M2M) and users to users (U2U). Mobile connectivity is only constrained by limited network coverage and bandwidth.

*Accessibility and reach-ability* as the result of mobile connectivity mean that users can be reached anywhere anytime, and can be restricted to particular contexts and persons.

*Localization* refers to the ability to locate the geographical position of a user or mobile device. Users' location information can be exploited to offer location-based relevant services.

*Ubiquity* exemplifies the ultimate form of spatial, temporal and contextual mobility. It includes all the aforementioned characteristics. Users have the possibility of using services anywhere, any time; independent of the user's location using always connected portable devices.

Successful mobile business service offerings should leverage these aforementioned aspects in its offering in order to differentiate it from non-mobile online offerings or in rural Africa's case, from off-line offerings.

### **3.2 Mobile Business Models**

Wireless service operators want to move from basic 'telephone' services to more and more value-added services. Integrating services with capabilities inherent in the network, also referred to as *network enabling*, is an important implementation aspect of this move<sup>145</sup>. A large number of actors are experimenting with innovating business models for various services broadly categorized as information, communication, transactions or entertainment<sup>146</sup>. Despite the wide use of the concept of a business model, there is not a generally accepted definition of what a business model is. In its most simplistic form it can be defined as what a

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<sup>144</sup> Junglas IA & Watson RT, 2003

<sup>145</sup> Samuelson M & Dholakia N, 2002

<sup>146</sup> Camponovo G & Pigneur Y, 2002

business does and how a business makes money doing those things. Timmers<sup>147</sup> expands on it and defines a business model as:

*... the architecture for the product, service and information flows, including a description of the various business actors and a description of the sources of revenues.*

Camponovo & Pigneur<sup>148</sup> offer a similar definition based on their research of literature on business models and within the context of m-business models:

*A business model provides a description of the roles and relationships of a company, its customers, partners and suppliers, as well as the flows of goods, information and money between these parties and the main benefits for those involved, in particular, but not exclusively the customer.*

Even though there is generally consensus about the huge potential of mobile business services, exploiting the possibilities provided by the continuous innovation in mobile technology with valuable services that people will be willing to pay for, remains a constant challenge. This is especially true for the rural poor of Africa where affordability is a major factor to consider for m-business models in term of viability.

### **3.3 A Value Constellation perspective of the Mobile Business Industry in Rural Africa**

Mobile business services are by definition a social innovation, requiring the collaboration of a large number of actors or market players, including the customers. Complete mobile services solutions require inter-compatibility of different networks, devices and applications. This makes the mobile business market highly fragmented and complex. Together, within this mobile ecosystem, the complex network of different industries, companies, content aggregators and enablers collaborate within a *value network* to provide mobile services to customers. According to Timmers<sup>149</sup> a *value network* is a:

*... multi-enterprise network of relationships focused on integration of information flows to exploit information and knowledge in the network for strategic business objectives.*

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<sup>147</sup> Timmers, 1998, p4

<sup>148</sup> Camponovo G & Pigneur Y, 2003, p4

<sup>149</sup> Timmers, 1998

Timmers' views on *value networks* resemble the earlier work of Normann & Ramirez<sup>150</sup> in which they presented the idea of a *value constellation*. They viewed Michael Porter's concept of a *value chain*, as defined in 1985, to be as outmoded as the old assembly line that it resembled. In their view, the idea, with its emphasis on *upstream* suppliers and *downstream* customers, is modeled on the assembly line. This restricts thinking because it is linear, sequential and unidirectional. The value chain concept is built around the idea that value is added, in sequence, by suppliers along the chain. Normann & Ramirez suggest that a better way to define where values lies is to recognise that it arises in the way the customer uses the product or service on offer. Value is determined by the value-creating potential provided for the customer in their business or their home. Value is therefore not determined by what a supplier achieves in its own business, but by what it helps its customer to achieve.

According to Normann & Ramirez the focus of strategy should be the value-creating systems, within which different economic actors (suppliers, business partners, allies, customers) work together to co-produce value to the customer. However, successful companies do not just add value, they are *value innovators*. Increasingly *products* produced today are part of a dense, *bundled*, package that includes many services, with a blurring of the boundary between product and service. This *blurring* is very apparent in the offering<sup>151</sup> to mobile phone subscribers with its bundling of many elements in a single offering of access to mobile communication: wireless infrastructure, handsets, connectivity, voice calls, text messaging, financing, value adding services like content, mobile banking, to name a few. The participants in the co-production, also referred to as the *constellation of actors* by Normann & Ramirez, have complex, simultaneous and multi-directional relationships. These participants in the co-production to create value include suppliers and subcontractors as well as customers and often even their customers. In co-productive terms, value is manifested thanks to the *enabling* which the supplier brings to the customer's own value creating activity. The key strategic task is seen to be the reconfiguration of roles and relationships among this constellation of actors in order to mobilize the creation of value in new forms and by new players. From a system approach, the value is not in the part, but in the interactions between the parts.

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<sup>150</sup> Normann R & Ramirez R, 1993

<sup>151</sup> Normann & Ramirez suggest using the word *offering* because they are of the opinion that the distinction between *products* and *services* is outmoded.

Normann & Ramirez<sup>152</sup> argue that the real goal of strategy is to create an ever improving fit between competencies and customers. They further claim that successful companies consider strategy as *systematic social innovation: the continuous design and redesign of complex business systems*. Vesa<sup>153</sup> interprets their view on strategic goals to be very different from the traditional profit-maximizing goals. He finds their ideas to be very useful when trying to make sense of what is happening in the mobile industry, since he sees mobile business by definition to be a social innovation, requiring close cooperation of various social actors, including customers.

Normann & Ramirez's ideas are especially applicable when making sense of mobile business in rural Africa using a livelihoods approach. The livelihoods approach is a way of thinking that is *bottom up* in that it places people at its center and acknowledge that the poor are not just victims, but exercise their rights in their choices. The concept of a *value constellation* is also *bottom up* in that it places the customer at its center. Value is determined by the value-creating potential provided for the customer in *their* business or *their* home or as applicable in this context, *their* livelihood strategy.

Another important feature of livelihoods thinking is that it promotes an approach to development problems that transcends individual sectors and encourages the complex challenge of building cross-sectoral, multi-disciplinary partnerships in creating a value constellation. Delivering on the challenge of developing a mobile business environment for rural Africa has taken the collaboration of far more diverse players than those seen in mobile ecosystem for the developed world, working together as *value innovators* in order to deliver solutions applicable to the local context.

Literature researched for this paper has revealed evidence of a growing body of international players, from the corporate world to academia and development agencies, who are collaborating with local communities in exploiting mobile technology to develop mobile value-creating systems through *systematic social innovation*. Often socio-economic upliftment rather than profit-maximizing is the primary goal, with complex business systems being redesigned to make them valuable, useful and affordable for rural African customers, who are amongst the poorest of the poor.

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<sup>152</sup> Normann R & Ramirez R, 1993, p69

<sup>153</sup> Vesa J, 2005

### 3.4 Redefining Mobile Business Models

In order to enable an investigation into emerging mobile business models for African Rural Communities, it is proposed that it is redefined for this particular context using a Livelihoods Framework and Value Constellation perspective. Mobile business models for African Rural Communities will therefore be defined as:

*Value-creating activities enabled by the appropriation of mobile telecommunication solutions within chosen livelihood strategies, with the objective of increasing livelihood assets for positive livelihood outcomes.*

Unpacking this proposed definition, there are two main components: *mobile telecommunication solutions* and *value creating activities* within chosen livelihood strategies. A third, but equally important component, is the users' *appropriation* of the mobile telecommunication solutions.

Firstly, creating appropriate, enabling *mobile telecommunication solutions* falls within the domain of the multiple players in the mobile business industry operating in Africa. It is in the hands of these players to *adapt* their offering through innovation in order to develop an *application infrastructure*<sup>154</sup> that is relevant to the African rural communities' vulnerabilities and livelihood strategies. The mobile business industry in rural Africa is a very recent one and all players in this context are faced with enormous challenges to overcome the complexity of providing complete end-to-end solutions. These challenges require many complementary competencies, necessitating partnerships with a number of actors in a *value network*. Together they are experimenting with different business models and adapting the technology and service offering to suit the local context. It is yet to be seen which of these business models will prove to be the most viable and sustainable in this difficult, but exciting environment. The various players making up this value network and the extent to which they have adapted their offering to create enabling mobile business models for value creation will be explored in the next chapter.

Secondly, *value creating activities*, enabled by mobile telephony, in the pursuit of positive livelihood outcomes and an increase in livelihood assets fall within the domain of the users of the mobile solutions. Their value creating activities fall within the parameters of their livelihood strategies, which has previously been categorized into agricultural intensification,

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<sup>154</sup> Kalakota (2001) defined m-business as *the application infrastructure required to maintain business relationships and sell information, services, and commodities by means of the mobile devices.*

livelihood diversification and migration. The African rural communities' value creating activities, enabled by mobile telephony, will be investigated in terms of these livelihood strategies. It will also be investigated how these mobile phone enabled activities lead to an increase in their livelihood assets (in terms of financial capital specifically and social capital broadly), within each identified livelihood strategy stream.

In order to bring Schumpeterian *gales of creative destruction*<sup>155</sup> to the to-date still unsuccessful socio-economic upliftment efforts in the rural African environment, it is crucial that the communities that the technology is meant to uplift adopt it as their own. In fact, Bar et al<sup>156</sup> argue that users should go beyond mere adoption of the technology and *appropriate* it as their own in order to *assimilate* and embed it within their social, economic, and political practices. It is only then that they can realize the value-creating potential of mobile telephony and make it useful within their livelihood strategies. Mobile business models can only successfully contribute to long-term sustainable livelihoods if mobile telecommunication and its value enabling solutions have been assimilated into the users lives. *User appropriation of mobile telephony* therefore becomes another important bridging factor to investigate.

The rest of this research will be structured according to these three identified components of mobile business models for rural Africa: *firstly*, an investigation into the *constellation of actors* responsible for innovating and developing appropriate mobile value enabling solution; *secondly*, user *appropriation* of mobile telephony; and *thirdly*, an overview of how the value creating activities, made possible by the assimilation of mobile business models, can lead to an *increase in livelihood assets*.

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<sup>155</sup> Boisot M, 1999, p 99, citing Schumpeter J, 1961

<sup>156</sup> Bar F et al, 2007

# Chapter 4

## The Constellation of Actors in a Mobile Business Industry for Rural Africa

### 4.1 The Mobile Business Application Framework

Looking at the participants who are active in creating a mobile business environment and therefore mobile *value constellations* in rural Africa, the *Mobile Business Application Framework* as proposed by Camponovo & Pigneur<sup>157</sup> will be used (see Figure 4.1).

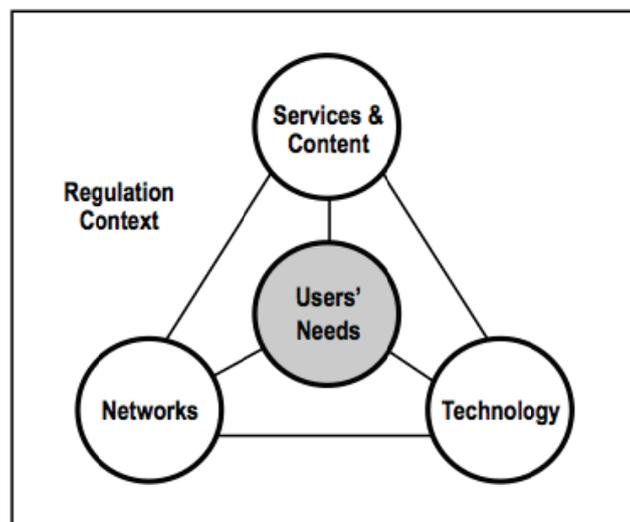


Figure 4.1 - Mobile Business Application Framework

(Source: Camponovo G & Pigneur Y, 2003)

This framework places the end-user with mobility-related needs at the centre. The rest of the framework is completed by three necessary and complimentary groups of market players that, in partnerships, aim to deliver to these needs: *networks and communication* (including the different networks that provide transmission capabilities), *device and information technology* (composed by all the necessary hardware, including network equipment, mobile devices and

<sup>157</sup> Camponovo G & Pigneur Y, 2003

platforms) and the *services and content* (including applications, content and supporting services). These groups are constrained by regulations, the social context (poverty, illiteracy) and a lack of infrastructure (roads, electricity). They therefore have a very different environment in rural Africa to contend with than market players in the developed world.

In their efforts to realize International Development Targets and empower the poor, the international community, in collaboration with local partnerships, has made a considerable effort in recent years to realize the potential of ICT in general, and mobile telecommunication specifically, as a development tool that can fill the gap of access to information, knowledge and communication. They actively engage in research and pilot projects, participate in international dialogue and contribute to innovation funds. The result is an increase in the integration of these technologies into development projects in all sectors. They also work closely with developing country governments, NGOs and the private sector, exploring new partnerships to find the proper balance between private and public initiatives when developing appropriate solutions for the rural poor. However it is worth taking note of Marker et al's<sup>158</sup> point that it is important for the private sector, industry, donors and governments to resist the temptation to try to pick solutions and decide which are the most appropriate for the poor. The poor will choose the most appropriate and affordable services for their needs.

Many ICT projects that have been deployed to address specific development challenges without adequate attention to their broader context, or sufficient understanding of the underlying conditions for success, have not met their expectations or proved sustainable in the long run<sup>159</sup>. It is therefore important to be aware of the complex nature of this market that one would have to address as a player in the mobile ecosystem of rural Africa.

The needs of the majority of rural African potential customers revolve around a daily struggle for sustainable livelihoods. The players in this mobile market have to adapt their value offering to be suitable to these users' requirements. Ensuring that user requirements for value creating activities are actually met will require ongoing learning from implemented projects and iterative innovation in line with user appropriation of the technology. Existing research also provide good guidelines for potential service providers.

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<sup>158</sup> Marker P et al, 2002

<sup>159</sup> McNamara KS, 2003

Research by the Overseas Development Institute (ODI)<sup>160</sup> on livelihood approaches to ICTs in support of rural poverty elimination, reached the key conclusions that ICTs are most likely to improve livelihoods in rural areas if they: build on existing systems; share costs appropriately; ensure equitable access to all; contain a high proportion of local or appropriately localized content; build capacity; use realistic technologies; and build knowledge partnerships. Their conclusions became policy recommendations for the implementation of ICTs for rural poverty elimination and food security.

Technology, network and content providers, whether local or international, private or public, in partnerships with governments or developmental organization, are all important to making up the value constellations of mobile business in rural Africa. Their role and contribution will be further explored in the section to follow, using the Mobile Business Application Framework (see Figure 4.1) as proposed by Camponovo & Pigneur<sup>161</sup>. Examples of these players' implementations will also be discussed. Even though there are very few empirical studies available to substantiate claims of success, examples were chosen with a high level of value innovation appropriate to rural Africa, as well as complying to at least some of the policy recommendations by the ODI for the implementation of ICTs for rural poverty elimination and food security. These implementations will therefore have a high likelihood of successfully enabling value creation for sustainable livelihoods.

## 4.2 Technology

According to Camponovo & Pigneur<sup>162</sup> *device manufacturers* and *network equipment vendors* are the primary participants in the technology area of mobile business. Secondary players include component makers, device retailers and enabling technology vendors.

### 4.2.1 Device manufacturers

The value proposition of *device manufacturers* is that they provide the physical mobile devices or handsets that enable end users to access a mobile network and the ability to run mobile applications. Their target customers are device retailers and network operators' distribution channels. Network operators are important partners because they usually subsidize the devices of customers who enter service contracts and are actively encouraging

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<sup>160</sup> Chapman R et al, 2003

<sup>161</sup> Camponovo G & Pigneur Y, 2003

<sup>162</sup> Camponovo G & Pigneur Y, 2003

adoption. Their revenues come from the sales of devices to distributors. Mobile devices used in rural Africa are mostly restricted to handsets.

In an interview with the Economist<sup>163</sup>, Kai Oistamo of Nokia, the world's largest handset manufacturer, noted that people in poor countries have to spend a far larger portion of their income than those in the rich world to buy even the cheapest handset, making it much more of a status symbol in these societies. It is widely recognized that high prices of handsets inhibits growth of the mobile industry. This has led to various low-cost initiatives sponsored by both the Code Division Multiple Access (CDMA) and the Global System for Mobile Communication Association (GSMA). As part of its *Connecting the Unconnected* initiative, dating back to 2005, the GSMA selected Motorola to manufacture mobile phones which were specifically designed for the Emerging Market Handset programme and were to retail for under US\$30<sup>164</sup>. By February 2006 it was reported that mobile operators in developing countries have bought or ordered more than 12 million mobile phones from Motorola under the Emerging Handset Market programme<sup>165</sup>. Following these successes several international companies became very active in their innovation efforts to develop affordable handsets for the emerging market.

Vodafone in 2007 announced their partnership with a Chinese manufacturer ZTE Corporations to produce a range of ultra low-cost handsets to retail at US\$25 - \$45, depending on the model and the local market. They are designed to be durable and include popular functions like text messaging<sup>166</sup>. Other companies who are also increasing their marketshare in the field of ultra low-cost handsets are Nokia, Samsung, LG, Siemens, Alcatel and Mi-Fone, to name but a few. There are reports of basic no-frills handsets retailing for under US\$20, making the challenge set by the GSMA to give 80% of the world's population access to mobile communication by 2010 increasingly achievable<sup>167</sup>.

Even though affordability remains the main requirement for producing handsets for the African market, manufacturers also have to innovate solutions to cope with the infrastructure challenges in rural Africa. People do not necessarily have access to electricity, making it very difficult to recharge batteries. An extended battery life is therefore of great value, leading to

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<sup>163</sup> "Calling an end to poverty", Economist, 2005 Volume 376

<sup>164</sup> GSMA Emerging Market Handset Programme Press Release, 2005

<sup>165</sup> GSMA Emerging Market Handset Programme Press Release, 2006

<sup>166</sup> Vodafone Press Release, 2007

<sup>167</sup> Further contributing factors to reaching the goal of 80% access to mobile communication by 2010 are the common practice of mobile phone sharing as well as the refurbished mobile phone market.

Motorola's innovation of a low-cost handset that has a standby time of two weeks. Another infrastructure challenge is the low density of base stations in rural Africa. In response to this challenge, Nokia developed a phone that contains features such as a hookup for an external antenna to better reach distant base stations, but is also loaded with software to make it easier for the cost sensitive user to track the length and costs of a phone call<sup>168</sup>.

#### 4.2.2 Equipment vendors

*Equipment vendors'* value proposition is the provision of the logical infrastructure required to operate and manage the mobile network (including network management systems, application and service platforms) and the physical core mobile network infrastructure (comprising air interfaces, base stations, routers, switches and backbone transport technologies). They also offer infrastructure related services such as network design, evolution planning, integration, implementation, optimisation and operation. According to Camponovo & Pigneur<sup>169</sup> the target customers of *equipment vendors* are the network operators such as mobile network operators and Internet Service Providers (ISPs). However, in Africa the mobile network operators mostly fulfill this role in collaboration with other vendors of technology.

The mobile network operators are the driving force behind the expansion of networks into rural areas. This is not only inspired by the pressure of meeting their license requirements, but also because of potential financial gains in these markets. Their plans for telecommunication coverage now determine how and when the poor and rural populations are reached by the 'digital revolution'. In their effort to build the required infrastructure with appropriate technology, they are faced with enormous logistical challenges due to the lack of general infrastructure in rural Africa. One of the biggest problems they face is transporting the tonnes of steel and sensitive equipment needed to build the transmitting towers (base stations) across roads which are often little more than pot-holed dirt tracks. Trucks carrying equipment can take weeks before arriving at their destination.

After the installation of the base stations, diesel for generators have to follow the same treacherous, slow roads. Because of the lack of electricity supply in rural areas, mobile operators have to provide their own power solutions. Each base station is equipped with two generators: one to power the station and one as backup. The cost of delivering diesel fuel to

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<sup>168</sup> "Upwardly Mobile in Africa", BusinessWeek, 2007

<sup>169</sup> Camponovo G & Pigneur Y, 2003

these locations is substantial, contributing to high running costs for operators. Often security guards, mostly recruited from the local village, have to be employed to guard the stored diesel. An estimated eighty percent of the operational cost of rural cellular networks can be attributed to the associated costs of fuel transport, security and protection<sup>170</sup>. The monthly cost of running a rural base station was calculated in 2007 to be in the region of US\$20 000 as opposed to US\$2 500 for an urban base station with relatively easy access to roads and grid power<sup>171</sup>.

- **Innovation to overcome the lack of infrastructure**

Mobile operators are turning to creative solutions to power their towers in the absence of reliable grid power, often with excess capacity for local energy users. Hybrid systems have been developed that utilize renewable energy sources such as wind and solar energy. In Kenya the biggest wireless companies, Safaricom and Celtel, have contracted WinAfrique in 2005 to design and supply wind/diesel hybrid systems for twenty five remote base stations by the end of 2007. A case study<sup>172</sup> on the implementation of this system reports on the village Laisamis, Kenya that has no electricity, no running water, no sewers, no radio, no television, but does have a mobile phone service. A mobile phone battery charging station was also added to the base station. This Safaricom base station was handling thousands of calls in 2007 in spite of the very low average household income.

Motorola<sup>173</sup>, with the support of the GSMA, is trialling the use of wind and solar generators in Namibia as an alternative to diesel power for remote sites. Wind and solar powered stations require less maintenance than diesel generators, making it potentially more viable for operators to connect people in remote communities.

Swedish telecoms network group Ericsson and South Africa-based MTN, with support from the GSMA's development fund, are planning to replace fossil fuels with sustainable biofuels made from crops grown by local farmers for electricity generation for powering mobile phone base stations across rural Africa. The project is to be piloted in Nigeria<sup>174</sup> in 2008 and then replicated in Uganda, Rwanda and Kenya. In Nigeria fuel will be processed from palm, groundnut, pumpkin seeds and jatropha. The crops to generate the biofuel will be cultivated

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<sup>170</sup> Van Grinsven L, 2006

<sup>171</sup> Southwood R, 2007

<sup>172</sup> Bergey Windpower Case Study, 2007

<sup>173</sup> Motorola White Paper, 2007

<sup>174</sup> 75% of Nigeria is not grid-connected to electricity

and processed close to the base stations, helping local farmers, cutting dependency on fossil fuels and reducing transportation needs. Ericsson will control farming methods, making sure crops are not genetically manipulated, are grown sustainably and do not require any forests to be cleared. According to the chief technology officer of MTN, Karel Pienaar, the early adoption of biofuel-powered mobile networks would place Africa at the forefront of a new wave of innovation. It is estimated that the introduction of biofuels can reduce costs by 30%, a cost saving that can be passed on to consumers in order to make connectivity more affordable to the poor rural communities<sup>175</sup>.

Some operators, frustrated with slow-moving power monopolies, go even further to resolve the unreliable power issues and build their own electrical lines to base stations. South Africa-based MTN, for instance, has installed its own fiber optic networks in Nigeria. Providing power solutions has been so integral to providing mobile communications technology infrastructure, that it has even been suggested by some commentators that if mobile phone companies begin building larger, more efficient power generating facilities, they could service local communities with power as well as telephony. Southwood<sup>176</sup> suggests that universal service funds, a tax on telephony revenue designed to subsidize deployment of telephone service in rural areas, could be used to build electric power networks, not just phone networks. He claims that these funds have raised US\$6.5 billion, but only \$1.7 billion has been spent, leaving a large amount which can be redeployed. It is quite possible that the innovative mobile phone companies might end up as the key force to wire rural Africa to electric power<sup>177</sup>.

It is clear that, in the process of providing the infrastructure for a mobile business environment in rural Africa, the technology players fulfill a very important role in the mobile *value constellation*. They contribute in socio-economic upliftment not only through the power solutions that they implement, but also through providing employment to locals during the construction phase as well as ongoing maintenance of equipment. In the case of biofuels, they also provide a new market to local farmers.

- **Technology Players as Innovators of Mobile Business Models**

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<sup>175</sup> Van Grinsven L, 2006

<sup>176</sup> Southwood R, 2007

<sup>177</sup> Zuckerman E, 2007

Besides adapting their offering, some technology players are also innovating mobile business models to enable more affordable connectivity for emerging markets. The Nokia Siemens Network<sup>178</sup>, an equipment joint venture with Nokia and Germany's Siemens, is taking the Grameen's Village Phone Program a step further. Combining their technology with business model innovation in order to provide solutions for the emerging world, they represent the *systematic social innovation* as postulated by Normann and Ramirez<sup>179</sup>. Through the *redesign of complex business systems* they have developed a value-creating system that can contribute to socio-economic upliftment in rural Africa and similar communities around the world. The Nokia Siemens Network recognized and set out to deliver to the challenge of providing services in an economically feasible manner. In order to do this, they addressed three key areas: the development of innovative technologies to deliver low-cost solutions, creating novel business models for rural areas and the synthesis of a new value network to make the solution feasible. Their main innovation is on the business model, but their technology solution is integral in making it possible. Their model requires many players to work together, some of whom will be entering the mobile communication value network for the first time. These stakeholders include the subscriber, the entrepreneur, a GSM operator, the authorities, other mobile network operators and financiers.

The Nokia Siemens Networks' offering, the so-called *Village Connection*, aims to build rural connectivity village by village, exploiting a franchise-based business model between operator and local village entrepreneur. According to the model a local entrepreneur works with a regional operator and a micro finance entity to set up a wireless phone network, *Access Point*, for a few thousand dollars.

The *Access Point*, which supports up to seventy Nokia handsets, can be set up without trained network personnel within a very short amount of time. The local entrepreneur then acquires subscribers and, working with the operator, can offer a range of service options to meet the needs of customers, including a flat rate for local calls and pre-paid or post-paid services. The entrepreneur also provides billing and invoicing to all subscribers, as well as local product support. A variety of value-added services can also be added, such as cost-effective Internet services in villages via the Internet protocol link. Villagers can talk within the local system at a reduced rate, connecting to the more costly national network only for long-distance calls.

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<sup>178</sup> Nokia Siemens Network, 2008

<sup>179</sup> Normann R, Ramirez R, 1993

Village Connection was deployed extensively with great success in rural India and is currently being tried out in Tanzania in collaboration with Vodacom Tanzania. It is envisaged that subscribers will be charged in the region of US\$3 per month, compared to the average US\$10 per month currently being charged by most mobile service providers in the region. This represents a significant saving for users, making mobile telephony accessible to those with very little income available to spend on communication services. By implementing the Nokia Siemens Networks' appropriate technology innovation, mobile operators who are active in rural Africa can expect a considerable reduction in the capital expenditure and operating costs of providing connectivity to these rural regions. They can therefore afford to pass on the saving to the subscribers.

In order to lower expenses, the Village Connection relies on network technology, which not only affects the capital expenditure (CAPEX) but also directly impacts operating costs (OPEX)<sup>180</sup>. A conventional hierarchy increases network complexity and entails higher operating costs in terms of deployment and maintenance, backhaul and utilities. The Village Connection's network model comprises GSM access points located in villages and regional access centres. A village typically hosts one access point module comprising GSM radio, power and IT hardware and software components. The access point merely requires simple installation and powering, for instance, by solar energy. Each access point connects to standard GSM mobile devices and autonomously handles calls within a village through local switching. Access points are connected via Internet Protocol links to a regional access centre. The access centre connects the villages to the main GSM core network and handles the calls between the villages. In some cases the network will use satellite connectivity to act as a backhaul, distributing traffic among geographically dispersed sites<sup>181</sup>.

### 4.3 Services

In Camponovo & Pigneur's<sup>182</sup> framework mobile services are seen to be value-added services, content and applications that the user can access on his mobile device. Within their framework *content providers*, *application providers* and *payment agents* are the primary actors in this domain. A major goal for these actors is to provide usable and useful services

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<sup>180</sup> Nokia Siemens Network, 2008

<sup>181</sup> Nokia Siemens Networks Press Release, 2008

<sup>182</sup> Camponovo G & Pigneur Y, 2003

that would really improve people's lives. Davis & Ochieng<sup>183</sup> noted that agents in both the formal and the informal economy in Africa are coming together to develop innovative products and services by employing mobile telephony, most notably, as an infrastructure service; a market, weather, and health information exchange mechanism; a financial sector service (virtual currency, electronic accounts or banking); and an investment sector service. It is unlikely that a list of these services can be compiled that could be considered useful by all African rural communities; however, there are some notable examples of universally useful services that will be discussed here.

As far as revenue models go for providing mobile services to rural Africa, even though affordability is the main consideration, Roberts & Kernick<sup>184</sup> point out that development experience and research indicates that goods or services provided free of charge are valued less by recipients than those that require an investment on the part of the user. Therefore, even for subsidized services, they recommend that a nominal fee should be charged in order to screen out users with no intention of using services, while assisting subscribed users to use services for maximum gain.

#### **4.3.1 Content Providers**

The value propositions of *content providers* are that they provide information products and relevant data for distribution through mobile channels. They target their proposition at the end-customers of mobile networks, but also content aggregators and portals in order to broaden the reach of their products. Their revenue flows come from subscription, usage and syndication fees<sup>185</sup>.

Technology is useless without content and context. If the goal is to achieve social development, then the content and context needs to be locally centered on the specific needs of the poor and the constraints to their livelihoods. The local context must be understood in relation to other constraints that may be of a technical, economic, social or policy nature. Communities should not be seen only as passive recipients, but also as active content generators in their own right<sup>186</sup>.

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<sup>183</sup> Davis K & Ochieng C, 2006

<sup>184</sup> Roberts M & Kernick H, 2006

<sup>185</sup> Camponovo G & Pigneur Y, 2003

<sup>186</sup> Chapman R et al, 2003

The most important and empowering initiatives for content provision to African rural communities are those that focus on agricultural livelihoods, by providing better access to markets, prices and product information. This information enhances their capacity to take informed decisions and strengthen their negotiation position. These services are becoming increasingly available throughout Africa through partnerships between multiple players: governments, private service providers, international development agencies and farmer groups. Currently the evidence of farmers' benefits is mostly anecdotal, with limited references available to rigorous impact assessments<sup>187</sup>. There are, however, projects that have claimed incredible success at improving the livelihoods of rural communities through the implementation of projects that provides applicable information services to these communities. Manobi is one of the enterprises that reported proof from their experience that giving access to market information services significantly increased the farmers' revenue over the US\$2 per day that defines the poverty threshold<sup>188</sup>.

Manobi, an international award-winning African ICT social development enterprise, and its philanthropic arm, Manobi Development Foundation, have implemented several projects in Africa where they provide specific and localized information services to help small farmers to be more profitable within their value chains. In order to encourage the sign up of rural customers for these agriculture-related information services, Manobi enters into partnerships with handset manufacturers and service providers to provide an affordable package. The mobile phones are subsidized and fees applying to the data call or SMS are kept low. Companies are willing to partner in projects of this nature because, as the mobile phone market is expanding into rural areas, they see it as an opportunity to sign up new customers before the competition. Service providers believe that if people start off using their products they will stay with it once they become profitable clients<sup>189</sup>. Companies delivering agricultural information services are often also subsidized by governments and international aid funding like UNAid and the Information for Development Program (InfoDev), a global grant program which is managed by the World Bank to promote innovative projects on the use of ICTs for development.

Manobi, with partial funding from InfoDev, partnered with Senegal's mobile operator, Sonatel and Alcatel to offer Senegalese farmers subscription to their multi-channel service

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<sup>187</sup> Davis K, & Ochieng C, 2006

<sup>188</sup> Manobi Development Foundation, 2008

<sup>189</sup> Manobi Development Foundation, 2008

platform, which provides them with information, a trading platform and a business space. Due to the lack of existing markets' pricing information systems, Manobi employs people using PDAs (personal digital assistants) to collect and upload data every day from the various markets. The farmers can access the information on a web-based trading platform via Internet-enabled phones or can request prices and make trades via SMS. Local businesses, like safari lodges and restaurants, also have access to the system, enabling them to order directly from the farmers.

Manobi, within the same partnerships, also collaborated with the Canadian International Development Research Centre (IDRC) in a project that aimed to support the livelihoods and improve the safety of Senegalese fishermen, who make up approximately seventeen percent of the Senegalese working population<sup>190</sup>. This project uses the same information dissemination platform as the project aimed at farmers, but with additional functionality that enable the fishermen to enter their fish stock information for marketing purposes, and to log their departures and estimated times of arrival. A major contributor to the success of this project is the mobile phone base station installed by Sonatel near the beach at Kayar, Senegal in March 2003, which provides mobile phone coverage up to fourteen kilometers from the shore. It was reported that the base station was to be upgraded to provide coverage to an expected seventy kilometer radius using Alcatel equipment.

Manobi reports that their experience with their projects in Senegal, aimed at farmers and fishermen, has proved two things for them: first, that with a bit of creativity, Africa's growth in mobile telecommunication can be harnessed to bring relevant market information services to rural poor populations who would otherwise be overlooked. Secondly, they have also observed that the poor, marginally literate Senegalese farmers, who never had access to mobile phones before, could easily and quickly jump the technology divide if the content and services truly met their economic and social development needs.

Manobi's extensive knowledge and experience on African needs for information have led to the International Institute for Communication and Development (IICD) entering into a strategic partnership with them in August 2007 for the support of several ICT development projects in Burkina Faso, Ghana, Mali, Uganda and Zambia. Manobi will assist the IICD's local partners to use mobile phone technology to improve existing information services. Secondly, Manobi will advise local governments on the use of mobile phone technology to

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<sup>190</sup> InfoDev, 2003

improve public information and to develop e-business. They will also implement projects similar to their projects implemented in Senegal that are aimed at the rural poor<sup>191</sup>. There are several other organizations in Africa that also provide the type of services as provided by Manobi.

The Eastern Corridor Agro-Market Information Centre (ECAMIC) started using mobile phones to improve market access for rural farming communities in Ghana towards the end of 2007. The project reaches a number of rural communities through the use of a variety of appropriate technology: mobile phones, the Internet, websites, community notice boards (chalkboards) and public address systems<sup>192</sup>.

The Kenya Agricultural Community Exchange (KACE) in partnership with Safaricom provides a service called SMS Sokoni. Their value offering is that they, via SMS dissemination, provide linkages between sellers and buyers, importers and exporters. They also provide information as to who buys and sells what commodity where and the price information for different markets.

Another innovative agricultural information product is the Banana Information Line<sup>193</sup>, a project of the Local Language Speech Technology Initiative (LLSTI), produced in partnership with the National Agriculture and Livestock Extension Programme (NALEP) of the Kenyan Ministry of Agriculture. The LLSTI is a global initiative led by Outside Echo, a United Kingdom not-for-profit organization that facilitates audio access to information, and works together with partners from India, South Africa, Kenya, and Nigeria. They provide the support needed for a team that has no prior knowledge of speech technology to produce usable, natural-sounding voices with a text-to-speech (TTS) system. A TTS line bypasses the need for literacy, as well as the problem of reaching farmers living in very remote areas. In Kenya the TSS system was used to provide farmers with information, which was initially limited to how to plant, grow, and harvest bananas, in either English or Kiswahili. This project ran as a pilot in 2006, but has since April 2008 been taken over by the National Farmers Information Services (NAFIS) information line, which covers a wider range of crops and livestock. Farmers are able to call the line from their mobile phones any time of day, every day, thereby allowing them to get information when they need it, and when it is most convenient for them.

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<sup>191</sup> IICD, 2007

<sup>192</sup> IICD, 2008

<sup>193</sup> Soul Beat Africa, 2008

### 4.3.2 Application Providers

According to Camponovo & Pigneur<sup>194</sup> *application providers* provide mobile applications and platforms such as middleware and application servers. They target a variety of players in the mobile value chain, such as business, consumers, network operators, portals and device manufacturers. In order to ensure the quality and compatibility of their services, they often have to partner with network providers, device manufacturers, system integrators and other application providers. They earn revenue from the sale of license fees, installation fees, and rental agreements for hosting, operation and maintenance services.

Apart from private companies, there are many examples in rural Africa of aid or developmental organizations building applications for the mobile platform, because no other communication platform (landline, Internet, postal services) is available or sufficiently reliable or affordable to offer the same level of coordination across Africa's rural communities and urban neighborhoods. As per content service providers, it is also very important that applications developed for the rural African market are appropriate and relevant to the environment, cultural and economic situation.

Believing that nobody would understand the needs of the African market better than Africans, the Massachusetts Institute of Technology (MIT) Design Laboratory, with sponsorship by Nokia, launched Entrepreneurial Programming and Research on Mobiles (EPROM) as part of their Program for Developmental Entrepreneurship<sup>195</sup>. They aim to foster mobile phone-related research and entrepreneurship. For the last two years they have been teaching mobile phone programming within Computer Science Departments in ten countries within Sub-Saharan Africa, including the University of Nairobi (Kenya), Makerere University (Uganda), GSTIT (Ethiopia), Kenyatta University (Kenya) and the Kigali Institute of Science and Technology (Rwanda).

EPROM hosts project-based courses that allows students to learn enough of the basics of mobile phone programming to design and launch their own mobile applications. They place a particular emphasis on opportunity analysis and product marketing, while on the development side they focus on SMS server-side application development, but also provide skills to build applications on the phone itself. Seed funding is also available for the best teams to turn their projects into commercial ventures.

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<sup>194</sup> Camponovo G & Pigneur Y, 2003

<sup>195</sup> Massachusetts Institute of Technology, 2008

One of their successes thus far has been an SMS application, Airtime Banking, developed for Kenyan airtime dealers in rural centers. Mobile phone users in rural areas are only able to buy airtime when they go to the market in town centers, but they do not make the journey very often because of the long distances required to travel. It is very difficult to monitor and conserve available airtime until their next journey. Using Kenya's standard airtime transfer techniques (Sambaza & Me2U) the application transforms a standard phone into an automated SMS gateway. When airtime is purchased, the airtime dealer updates the client's account on the system with the purchased value and the period that the client wants the amount to last. The Airtime Banking application sends a trickle of airtime to the client's phone over the selected time period, encouraging efficient airtime usage and guaranteeing the client access to airtime until the next trip to the market.

Very few applications for service delivery in the developing world are voice-based, since *SMS-applications* is still the most common way to implement services<sup>196</sup>. SMS messages are broadcasted to people subscribing to a particular service or sometimes some interaction is required from the user, as for example when a weather forecast is requested. An appropriate keyword is sent to the phone number associated with the service to get back an answer by SMS. The reasons for the success of SMS applications are numerous: it is affordable and easy to use; it is available on most phones and the network requirements are low. The illiteracy rate of rural populations can be a weakness associated with SMS applications, however the practice of community-shared phones assist in this regard in that it only requires one person with the abilities to read and write. SMS applications are a perfect fit for simple query-based services, however it does have limitations in applicability. People have to remember keywords and the format to enter them in order to get their answers. Interoperability between operators also presents a limitation when trying to send SMS-data. Banking systems based on SMS can therefore only work between users of the same operator.

*Voice Applications* are easy to use for illiterate people. It just requires a phone call to be placed to a specific number to reach the voice platform from which the required service is accessible. Navigation is done either by voice input or by pressing a number on the phone keypad. Besides the easy input mechanism, other benefits of voice applications include the low and predictable cost, low network requirements and the fact that VoiceXML technologies provide a standardized application development platform. However, even though the Local

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<sup>196</sup> Talukder AK, 2006

Language Speech Technology Initiative (LLSTI) has implemented successful voice application projects in Kenya, the availability of local languages in speech recognition and synthesis with applications remains an issue within the African context. Voice applications do not allow for large-scale development and deployment of applications, since multiple languages require additional investment per country<sup>197</sup>.

### 4.3.3 Financial Services Providers

Camponovo & Pigneur's<sup>198</sup> framework provides a limited view on financial services as it only addresses *payment agents* and does not specifically include banking services in this group. For the purposes of this paper their definition of *payment agents* will be expanded to include *mobile banking*, because mobile banking services have arguably been one of the most groundbreaking and successful services to be provided to rural Africa. Payment agents and mobile banking service providers will be grouped as *financial services providers*.

The value propositions of *financial service providers* are that they facilitate mobile financial transactions (*m-transactions*), either as the providers of banking services (*m-banking*), transfer services (*m-transfers*) or as payment agents (*m-payments*). These three types of *m-transactions* are often collectively referred to as *m-banking*.

*M-banking* gives users access to banking services like deposit taking and account management. A lack of access to even the most basic banking services has serious economic consequences. The rural poor have to rely on cash, which is far less secure than using the banking system. Unable to save reliably, they are more vulnerable to financial uncertainty. The mobile user can convert cash in and out of 'stored value' accounts linked to their mobile phone.

*M-transfers* enable users to transfer value between their accounts and other people's accounts. Unlike simple airtime transfer features, *m-transfers* support transfers of actual currencies. Donner<sup>199</sup> explains that this means a person can walk into an *m-transactions* location, 'cash in' as if he or she were buying airtime for a pre-paid mobile account, and then transfer that money anytime – often via text message – to merchants, utility providers or other individuals. People have been using these services to send remittances home, quickly and inexpensively.

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<sup>197</sup> Talukder AK, 2006

<sup>198</sup> Camponovo G & Pigneur Y, 2003

<sup>199</sup> Donner J, 2007

*Payment agents* provide a method of payment to end-users for cash-free purchases of goods and services via the mobile phone platform. They usually have to partner with financial institutions like banks and credit card companies for payment processing. Application developers of security solutions also feature as important partners. Their revenue comes from subscription and transaction fees.

M-banking can be distinguished between *additive models* and *transformational models*<sup>200</sup>. *Additive models* are those in which the mobile phone is merely another channel to an existing bank account. *Transformational models* are those in which the financial product linked to the use of the phone is targeted at the unbanked, who are largely low-income people. It is this transformational model that will apply to m-transactions within the rural African context.

Because of their costly infrastructures, rural areas with low population densities offer banks, very few attractive business opportunities. Furthermore, the products and services offered by most banks are generally unattractive to small farmers and micro-entrepreneurs, because banks often require a minimum balance to be kept in savings accounts in order to avoid service fees. Since few farmers can afford to keep enough in their bank accounts to avoid the service fees, they avoid banks altogether and use cash instead<sup>201</sup>. The value proposition of mobile financial service providers has enormous transformational consequences for rural Africa, where people are largely excluded from the financial services market. Transactions via mobile handsets and text messages hide the services' complex organizational and technical capabilities. Keeping it simple, affordable and appropriate to the rural user has contributed to the impressive take up of these services<sup>202</sup>.

There are several m-Banking services available in African countries such as CelPay in the Democratic Republic of Congo and Zambia, M-PESA in Kenya, MTN MobileBanking and WIZZIT in South Africa. Each has a different set of actors and services. Some countries' laws, for example, require stored value accounts to be managed by a registered bank, which requires mobile operators to partner with a bank. In other cases, banks are not involved. In M-PESA's case there are no banks involved in their African activities except as a holder for the float, which is held in a single account at the Commercial Bank of Africa in Nairobi.

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<sup>200</sup> Donner J, 2007

<sup>201</sup> Pickens M & Richardson B, 2007

<sup>202</sup> Donner J, 2007

M-PESA, run by Vodafone, an international telecoms firm, and Safaricom, a Kenyan operator, with the backing of the British Government's Department for International Development, is an example of a successful *m-payment* scheme that provides an alternative to banks<sup>203</sup>. They had a full rollout in March 2007 and by June 2007 already had around 500 agents and 150 000 customers. M-PESA's customers can withdraw cash and make payments or send money using their phones, even though most of them do not have bank accounts. The cash points are a network of airtime sellers dotted around the country: Safaricom shops, petrol stations, or any other shop used to handling cash. Once they have verified a customer's identity via their telephone number, the agents will facilitate a transaction. The system also enables expatriate remittances to be sent to Kenya. M-PESA has created its own financial system, including clearing and settlement. They keep tabs on all the money, but in order for Kenya's central bank to tolerate them, they cannot pay interest or invest the float.

In Zambia and the Democratic Republic of Congo, mobile operator Celpay<sup>204</sup> is offering a SIM-based m-payment system – a *mobile wallet*, which allows users to use their phone to transfer funds to other subscribers of the service and pay for goods and monthly bills without any transfer funds charged. In order to use the services, Celpay's customers are provided with secure SIM cards. This adds a menu to their phones that facilitates payments and provides access to their accounts. Money can be added to the Celpay account by depositing money at a Celpay branch or via direct transfers from a bank account. They can then perform purchases from other subscribers to the service by entering the amount to be paid into their phone and sending an SMS. A PIN is provided to facilitate the transaction. As soon as the recipient enters the PIN (personal identification number), the money is immediately transferred to the designated account<sup>205</sup>.

The success of m-transactions relies on the power of network effects where, as more people become connected to the network, the value of the service increases for the individual user. However, financial services providers face some ongoing issues that will impact uptake as well as how their offerings evolve. Offering a physical presence throughout the country is one such issue. The systems require points of access with cash-in and cash-out facilities, and merchants need to be motivated to accept m-payments. Another issue is the complex

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<sup>203</sup> "Dial M for money", *Economist*, 2007 Volume 383

<sup>204</sup> Celpay was started by Celtel, a leading mobile operator in Sub-Saharan Africa, in 2003, but has since been acquired by FirstRand Bank, South Africa. Celtel disposed of Celpay because it has become non-core to the group's overall African strategy. (Source: <http://www.firstrand.co.za/default.asp?action=54&ID=98&a=1>)

<sup>205</sup> Pickens M & Richardson, 2007

regulatory environment that differs from country to country. The challenge for providers of financial services comes from managing issues like customer registration, fraud, money laundering and finding viable, scalable commercial models that work where the customers' disposable income is low. Important money-laundering and anti-terrorism laws can for example constrain what services can be offered. The common practice of sharing handsets complicates issues of security and account ownership. However it will have to be accommodated in order to extend the uptake of m-transaction services. A major issue is the literacy and language barrier that prevents some people from using these systems<sup>206</sup>.

## 4.4 Networks

The *mobile network operators* (MNOs) or carriers, and *Internet service providers* (ISPs) are the primary actors in this category. The mobile network operators certainly are among the most important players in the mobile field.

### 4.4.1 Mobile Network Operators

Mobile network operators give end-users physical connectivity, thereby providing them with access to their network. They also provide various network-related services such as location information, user identification and billing services to third parties. Their value proposition to end-users therefore lies in the provision of ubiquitous communication services. According to Camponovo & Pigneur<sup>207</sup>, given these players' central role in the mobile business, they are required to partner with a great number of other players including content providers, application providers, service providers, virtual operators and portals. They earn their revenue from charging their subscribers subscription and airtime fees, as well as from network services provided to other parties.

The introduction of mobile services has brought about a change in the business and operating climate of the African telecommunication sector as competing mobile operators have helped create an environment that fosters innovation and competition. Apart from providing innovative services that are specifically geared for the African market and its particular subscribers' requirements, operators also innovate around business models. *Celtel* provides an example of an innovative business model with its cross-border roaming free service.

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<sup>206</sup> Donner J, 2007

<sup>207</sup> Camponovo G & Pigneur Y, 2003

Launched by *Celtel* in September 2006, the *One Network* initiative initially offered their customers in Uganda, Kenya and Tanzania the opportunity to use their mobile phones in all three countries under the same conditions as in their home country without charging any roaming fee. This offer was expanded to Congo, Gabon and the Democratic Republic of Congo in 2007, with the intention to eventually include all fifteen countries that Celtel has a presence in. Not only can customers receive calls without roaming charges, they can also use recharging cards bought in any of those countries. With this innovative business model, Celtel has led the way in their response to the particular need in Africa of accommodating the strong cross-border relationships of users. This model has attracted the attention of other network providers. MTN is one of the networks who adopted the model and since the end of September 2007 offers a similar service in nine African countries.

In order to avoid problems of non-payment, networks adapted their business models for lower income countries by providing mobile telephony services on a prepayment basis. This is important in these regions where large groups of the population are unbankable because of high levels of poverty. They therefore do not have the requisite credit ratings to be able to enter into a post-payment contract with a provider. It can also be inferred from the nature of the rural poor's erratic income streams that a committed, fixed monthly payment for mobile subscription is not desirable.

Other solutions provided by the networks to lower costs to their customers are free text messages to request a call back from another subscriber and the selling of low denomination recharging cards. Low top-up denominations reduce the barrier to entry to low-income subscribers. Networks also permit airtime transfer between subscribers. This has led to the phenomenon of airtime being used in several African countries as a form of cash.

#### **4.4.2 Internet Service Providers**

ISPs provide access to the Internet network for network operators and end-users. They earn their revenue from charging user subscription fees and traffic agreements with other ISPs. Even though the Internet is an incredible space for communication and sourcing information, there are very few success stories yet about Web usage on mobile phones in developing countries. To realize the potential of the Mobile Web, some adaptations are required to make it relevant for targeted rural communities who have no prior experience with web browsers and applications. Specific interest groups are currently focusing on building the appropriate

community to define a roadmap for the development of the Mobile Web for the developing world<sup>208</sup>.

## 4.5 Regulation

Governments, regulation authorities, and standardization groups make up regulation-related players in the mobile ecosystem<sup>209</sup>. They can have a huge influence on other players in that they set the policies and legal environment in which mobile business will grow. Regulation authorities determine the legal framework that provides the economy and population with a wide range of competitive telecommunications services. Apart from legislation, they also manage frequency allocation and service licenses as well as monitor compliance with legislation and antitrust requirements. Licence fees and taxes forms the basis for their revenue flows.

It is said that much of the unprecedented growth in the mobile industry in Africa had been stimulated by competition, policy and regulatory reform in most African telecommunication markets. The telecoms market was partly liberated in many African countries from the mid-1990s, including the issuing of mobile licenses, often to international operators. It is important for governments to develop sound competition policies to encourage mobile penetration. To illustrate this point, Coyle<sup>210</sup> refers to research done by the World Bank in 41 African countries, which found that the introduction of second and subsequent competitors from the private sector accelerates mobile penetration, whereas the presence of state-owned telecoms in the market inhibits diffusion. Unfortunately many African countries still have dominant state telecoms operators with sufficient power to ensure the regulatory framework is designed in their interest.

Even in countries where competition policies exist a more stable regulatory environment is still called for, as it is said to be *common in certain areas for a regulator to accept something one day, only to alter rules the next, and when there is a change of government there is a change of rules*<sup>211</sup>. With the international mobile industry planning to invest \$50 billion dollars in sub-Saharan Africa over the next five years, it is up to African governments to ensure that sufficient spectrum is available for mobile broadband services. They also need to

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<sup>208</sup> Talukder AK, 2006

<sup>209</sup> Camponovo G & Pigneur Y, 2003

<sup>210</sup> Coyle D, 2005

<sup>211</sup> Ricknäs M, 2008, quoting Mohammad Hassan Omran, the chairman of Emirates Telecommunications Corp. (Etisalat)

address mobile-specific taxes, high license fees, international gateway monopolies, interconnection and other regulatory constraints to the competitiveness of the African business environment. Only then can the full social and economic benefits of this investment be realized.

The International Telecommunication Union's (ITU) African Telecommunications ICT Indicators 2008 report<sup>212</sup> canvasses infrastructure sharing to minimize duplication. This is especially important in countries that require growth investment in ICT facilities and lower prices because of the high levels of poverty amongst potential mobile subscribers. Governments should promote policies that encourage infrastructure sharing. In order to incentivize the expansion of affordable access to rural areas, governments also need to participate in public-private partnerships where appropriate and address policies and regulations. They should enhance the capacity of institutions to be able to develop and support the services and content that is made possible by ICT, and especially mobile telecommunication since it is currently the most accessible ICT in rural Africa.

The lack of a constant source of electricity remains a major bottleneck for rural connectivity in Sub-Saharan Africa. If Nigeria with its relatively high level of electrification is removed from the equation, then rural household electrification stands at five percent. Mobile operators are using diesel-powered generators and solar solutions as alternative power sources, but neither has so far proven to be optimal<sup>213</sup>. Since it is up to the mobile operators to maintain these alternative power sources, there is a cost implication for the end-customer. The ITU has suggested in its African Telecommunication ICT / Indicators 2008 report<sup>214</sup> that governments should consider offering tax rebates to offset the high costs of energy for telecommunication operators. They also recommend private-public partnerships between utilities and telecommunication operators to address specific energy needs.

## 4.6 Users

Camponovo & Pigneur<sup>215</sup> quite rightly state that end-users can ultimately determine the success or failure of mobile business, making them very important players in this game. Any

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<sup>212</sup> International Telecommunication Union, 2008a

<sup>213</sup> International Telecommunication Union, 2007

<sup>214</sup> International Telecommunication Union, 2008a

<sup>215</sup> Camponovo G & Pigneur Y, 2003

value offering of a mobile business model needs to be guided by users' needs, with iterative innovation cycles in order to ensure optimum adoption.

Sustainable mobile business models will be those that address the sustainability of users' rural livelihoods, which entails not only addressing their livelihood strategies as opportunities, but also take cognizance of their vulnerabilities as risks. The rural poor are not just deprived of basic resources, they also lack access to information, markets and institutions, knowledge, political visibility and communication; the lifeblood of economic and social interaction<sup>216</sup>. It is in these areas that mobile telephony can facilitate the highest value creating activities, because they are all vital issues to people's lives and livelihoods, enabling them to cope with challenges.

The take up of mobile communication in rural Africa has exceeded all expectations and has resulted in significant new investments in projects, infrastructure development and research to serve this market. The resulting evolution in the technology offering is strong evidence of the power of the user in the technology-adoption process. User adoption of the mobile technology offering and the ways in which they create value in terms of their livelihood assets, utilizing the mobile technology offering, will be discussed in more detail in chapters to follow.

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<sup>216</sup> Marker P et al, 2002

# *Chapter 5*

## Appropriation of Mobile Telecommunication Technology in African Rural Communities

### 5.1 From adoption to appropriation

The statistics on the staggering rise of mobile penetration in Africa tell an important story of the significance of mobile technology, but these statistics do not reveal the complete picture of the impact it has on users. To fully grasp the social, economic and political impact of mobile telephony in rural Africa it is important to understand the level of user adoption. However, Bar et al<sup>217</sup> argue that we should not just understand adoption, but should understand appropriation: the process through which mobile phone users go beyond mere adoption in order to make the technology their own and to assimilate it within their social, economic, and political practices. Users need to appropriate technology in order for long-term innovative effects to occur.

Living in a society largely unaffected by the industrial revolution, evidence thus far presented in this thesis has illustrated that the introduction of mobile telecommunication and its rapid adoption in Africa has led to enormous social and economic consequences for rural communities. It would however be wrong to conclude that the socio-economic changes observed are driven by technological determinism<sup>218</sup>, where mobile technology is seen as the key governing force of society, determining cultural values, social structure and the trajectory of history.

Mobile technology implemented in Africa has been adapted to serve the uniquely African development needs, not always by design or as the result of an official policy. Davis & Ochieng<sup>219</sup> point out that mobile operators are forced to learn and adapt to the innovative

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<sup>217</sup> Bar F et al, 2007, p1

<sup>218</sup> The term, *technological determinism*, is believed to have been coined by Thorstein Veblen (1857 – 1929), an American sociologist, (Source: [http://en.wikipedia.org/wiki/Technological\\_determinism](http://en.wikipedia.org/wiki/Technological_determinism))

<sup>219</sup> Davis K & Ochieng C, 2006, p45

ways in which Africans, especially the poor and low-income earners, use their mobiles. They argue that African entrepreneurs, in both the formal and the informal economy, are creatively destroying<sup>220</sup> modern ICTs, turning them into products and services more appropriate to the capabilities and needs of the majority of the poor. Creative destruction of the technology occurs because human action shapes the technology in the way it is used.

Bar et al<sup>221</sup> see technology evolution as a cyclical process of adoption and appropriation that leads to re-configuration between the users and providers of the technology. They identify three cultural modes of technology appropriation, exhibiting different levels of engagement with the technology: *baroque*, *creolization* and *cannibalism*. *Baroque* users will, for instance, use and personalize their mobile devices as recommended by the providers and manuals. *Creolization* users will go a little beyond that and recombine original features with other features or components, resulting in new or different uses for the technology. *Cannibal* users, in turn, will dismantle, destroy or adapt the original device and its intended uses to create something new that represent who they are. The way in which these three modes of technology appropriation take place depends on the innovation capabilities and multiple strategies of technology use developed by individuals and communities.

Davidziuk<sup>222</sup> points out that there are varied and unequal access to and opportunity for appropriation of technology in diverse communities. From the high penetration rates of mobile phones in developing countries it is evident that mobile phones are no longer luxury or elite devices. However, poor and rich people have completely different ways of technology appropriation modes, with very different outcomes requirements. The way that they make sense of mobile technology will be very different because of the variations of previous access to telecommunication, capabilities, vulnerabilities, experience and the context in which mobile phones are used.

It is nearly impossible for the implementers of a new technology to anticipate the disruptive effect or social meaning of the innovation that they introduce, since they cannot foresee user sensemaking of the change introduced. Given the complex nature of implementing mobile telecommunication in the previously disconnected rural Africa, it has been even more difficult for implementers to anticipate users' sensemaking and its effects. The extent to

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<sup>220</sup> Boisot (1999) refers to *creative destruction* in terms of S-learning or Schumpeterian Learning in contrast to N-Learning which is seen to be incremental learning

<sup>221</sup> Bar F et al, 2007

<sup>222</sup> Davidziuk, A, 2007

which rural African users make sense of the introduced mobile technology within their context remains crucial to successful adoption of the technology. Sensemaking unlocks appropriation capabilities that allow them to realize the value-creating potential of mobile telephony and to adapt introduced features of the technology to make it useful within their livelihood strategies.

Considering the particular way mobile technology has been adapted and is used within a rural African context, with its own technical, social, economic, and political questions, the theory of *Social Construction of Technology* (SCOT) as defined by Bijker et al<sup>223</sup> can be applied. Other applicable theories that tie sociology and technology together and where the greater focus is on the human element, are *Features-Based Theory of Sensemaking Triggers* (FBST), *Adaptive Structuration* and *Social Shaping of Technology* (SST). All these theories are contrasted with *Technological Determinism*. The fact that their relevance can be illustrated points to the extent that African users have adopted the technology. They have made it their own by shaping it in accordance to their own requirements. The applicable theories are briefly discussed in the following section.

## **5.2 Theories on the social effects of technology on society**

### **5.2.1 Social Construction of Technology**

One of the basic assumptions within the Social Construction of Technology (SCOT) approach is that technological development cannot be addressed satisfactorily by focusing on technology alone, since people have choices regarding the form and use of a particular technology<sup>224</sup>. This is diametrically opposed to the Technological Determinism approach of seeing technological change to be autonomous in relation to society and the driver of social change.

Looking at the development of a technology, in this case the technology for mobile telecommunication, the reference framework should be expanded to include social, political, economic, cultural and technological factors, which together shape the way that innovations evolve<sup>225</sup>. In accordance to the SCOT approach, the development of mobile technology and solutions to service the rural areas of Africa should involve social processes by active and

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<sup>223</sup> Bijker WE et al, 1987

<sup>224</sup> Bijker WE et al, 1987

<sup>225</sup> Hamill L & Lasen A, 2005

ongoing community participation. The mobile technology and associated service offerings should be reconstructed through such social processes.

### 5.2.2 Features-Based Theory of Sensemaking Triggers

The features that were introduced by mobile technology in Africa triggered a cycle of individual-level sensemaking to social sensemaking to understanding, followed by actions as users found ways to use the technology, leading to a new cycle, beginning with individual-level sensemaking. Griffith<sup>226</sup> encapsulates this process in her *Features-Based Theory of Sensemaking Triggers* (FBST) that presents a model for anticipating users' understanding of the technology introduced. The FBST focus on users of a technology and is relevant during the knowledge stage of technology introduction, when a user is exposed to the new technology's existence and gains knowledge of its meanings and use.

Weick<sup>227</sup> states that new technologies are simultaneously the source of stochastic, continuous, and abstract events, which require ongoing sensemaking. He also pointed out that the growing disparity between the speed and complexity of information technology and the ability of humans to comprehend the outputs of technology create the potential for increased arousal. In discussing the extraction of cues, Weick states that even small or subtle features can have large sensemaking effects. Griffith<sup>228</sup> developed her theory from the basis of Weick's sensemaking theories. She states that the introduction of new technology often provides the following sensemaking triggering conditions: the situation is novel, discrepancy between what is expected and what is observed, and a deliberate initiative where one is asked to think.

It can be assumed that the introduction of mobile technology to rural Africa, where there is generally a very low exposure to other form of ICTs, would have led to an increased state of arousal. The novelty of the features that the technology offered would have been a trigger for sensemaking. Technology features that trigger sensemaking serve as a foundation for the process of how users come to understand and use the technology as a whole. It is only at the point that a technology's features have been made sense of that this technology's structures can be combined with human interaction and social structures. According to Griffith<sup>229</sup>,

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<sup>226</sup> Griffith TL, 1999

<sup>227</sup> Weick K, 1990

<sup>228</sup> Griffith TL, 1999

<sup>229</sup> Griffith TL, 1999

features that are noticed by users can be socially constructed into a system applicable to their specific requirements.

Griffith defines technology as a combination of features: distinct parts, aspects, and qualities. She distinguishes between *tangential* features and *core* features, where core features are the defining features of the technology. Changing or removing core features will change the overall nature of the technology. Core features are the most likely to trigger initial sensemaking of the technology. Users will usually choose to adopt the technology based on the core features. Rural Africans adopted mobile telephony for its core feature of providing the power to connect with other people almost anytime and anywhere through wireless communication.

Deliberate sensemaking initiatives are more likely for tangential features. If sensemaking and understanding of the features go beyond the individual, it can lead to a diverse set of mental models that is likely to promote insights or motivate user-led redesign. Such a scenario, combined with a deliberate initiative for redesign, may push the overall socio-technical system to evolve. There is considerable evidence of user-led innovation in Africa that could have been as the result of sensemaking of tangential features of mobile technology. After the adoption of the core features of mobile telephony, tangential features like the address book, call log, and airtime purchasing became known and understood to the point where it could go through a process of creative destruction and be adapted to the uses particular to the context and culture of the users. Over time, the choices they make about how to use mobiles to support them in their day-to-day lives become common practice<sup>230</sup>.

FBST ends where adaptive structuration and social construction theories begin. Features that trigger sensemaking at the individual level serve as inputs to adaptive structuration, which combines the outcomes of multiple individuals' sensemaking in a social construction process.

### 5.2.3 Adaptive Structuration

Adaptive Structuration theory<sup>231</sup> uses the initial user sensemaking as an input for understanding how technology is used and adapted within a particular context. Adaptive structuration, in contrast to a more techno-centric outlook, attempts to explain the complex interplay among human interaction, social structures, and information and communication

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<sup>230</sup> Donner J, 2008

<sup>231</sup> DeSanctis G & Poole MS, 1994

technologies<sup>232</sup>. The key to the adaptive structuration theory of DeSanctis and Poole<sup>233</sup> is that the role of advanced technologies is acknowledged to consist of two parts: firstly the structures that are provided by the technology and secondly the emergent structures resulting from human perception and use of the technology within their context. FBST, as described above, addresses the processes by which the technology's structures or features are made sense of. Only then can these technology structures be combined with human interaction and social features.

Having made sense of features of mobile phones like the address book, call log and the fact that the caller pays for the call and airtime purchasing, users in Africa had the know-how that led to user-led innovations like the practice of intentional missed calls (*beeping*) and using airtime as a virtual currency. Donner<sup>234</sup> uses the model of adaptive structuration to explain the growth of beeping. According to him *beeping* is an example of the ongoing, complex interplay between individual action, social practices and information and communication technological factors. Users have created a set of distinct social practices around the technology, rather than altering the technology itself.

According to the model of adaptive structuration, users select and amplify particular features of a technology, which in turn helps to shape how the technology will affect the structure of the group. However, pre-existing group norms simultaneously influence the choice of features and how they are used. In this way, the system, constituting both group structures and technological features, develops gradually over time.

Another principle of adaptive structuration theory is that the interplay between users and technologies shifts the equilibrium of system's use patterns over time. This evolution is evident in the case of beeping as users and mobile service providers are responding to this social practice. First, some mobile service providers are providing alternatives to beeping within their networks in order to increase their overall network traffic. Vodacom's networks in Africa offers a free SMS, which allows a subscriber to request a call back from another Vodacom subscriber. Mobitel Tanzania also allows subscribers to send a free SMS to anyone on the network, asking him or her to return the call. Second, communication norms for mobile phones and related protocol may be influenced by beeping's prevalence. On the one hand there is a level of annoyance and beeping fatigue, leading to callers disabling the caller

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<sup>232</sup> Adaptive structuration theory has its roots in general structuration theory, as proposed by Giddens, 1984

<sup>233</sup> DeSanctis G & Poole MS, 1994

<sup>234</sup> Donner J, 2007

identity functionality. On the other hand, experienced users are training new users in the rules of beeping on a daily basis. Even though beeping is practiced globally, the protocol around its use is local, with people learning it from each other, through interaction and observation.

#### **5.2.4 Social Shaping of Technology**

The Social Shaping of Technology (SST)<sup>235</sup> approach to understanding the trajectory of technology, similar to the SCOT approach, postulates that it does not develop according to an inner technical logic, but is instead a social product, influenced by the conditions of its creation and use. Every stage in the generation and implementation of new technologies involves a set of choices between different technical options. While technical considerations are important, a range of social factors affects choices, thereby influencing the content of technologies, and their social implications. Central to SST is the concept that there are choices inherent in both the design of individual artifacts and systems, and in the direction or trajectory of innovation programs. Even though these are not necessarily conscious choices, it leads to different routes with potentially different technological outcomes and implications for society and for particular social groups. This suggests an interactive model of innovation that responds to continuous feedback from users, which is very different from the more conventional linear model, which conceives the cycle of invention-innovation-diffusion as separate stages. In a linear model technologies are fixed solutions after the invention stage. They are diffused through the marketplace as established artifacts that will impact society or the workplace.

Many SST writers shared the deeper concern to emancipate science and technology in order for it to be accepted as subject to social forces and democratic decision-making<sup>236</sup>. However, different approaches within SST reach divergent conclusions about the character of technology, the social mechanisms of shaping and control, and thus about the methods of social intervention in technological innovation. Innovation is seen as a contradictory and uncertain process. It is not just a rational-technical problem-solving process; it also involves economic and political processes in building alliances of interests (amongst, for example, supplier firms, technologists, potential users, funding bodies and regulators) with the necessary resources and technical expertise, around certain concepts or visions of as yet unrealized technologies.

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<sup>235</sup> Bijker W et al, 1998

<sup>236</sup> MacKenzie & Wajcman 1985, Bijker and Law 1992

Technologies, therefore, are inclusive phenomena. Their development proceeds by interaction of various social and technical elements. These different components cannot be separated from one another, or treated as distinct variables; they are in constant mutual tension. Just as there is no linear effect of technologies upon society, so too the conditioning of technologies by social factors is not a simple one-way process. Technologies, once developed and implemented, not only react back upon their environments to generate new forms of technology, but also generate new environments<sup>237</sup>.

### **5.3 Creative Destruction in the Appropriation Process**

#### **5.3.1 Shared Phone Practices**

The operation of network effects is different where mobile phones are not personally owned. Ownership facilitates two-way communication because an individual is uniquely identified with a number. However, when a phone is shared, a non-owning user can make calls out but cannot receive spontaneous inbound calls. The distinction between models of access where shared ownership essentially facilitate one-way communication and individual ownership which permits two-way communication is important from a mobile business service offering as well as a policy perspective. The technology service providers have to adapt models that rely on identifying individuals by a phone number, as many individuals might be using the handset identified by the number.

#### **5.3.2 Beeping**

According to Donner<sup>238</sup>, between twenty and thirty percent of all mobile calls made in Africa are intentional missed calls, otherwise known as “beeping” or “flashing”. Conditions of economic scarcity in Africa have made the user-led innovation of beeping or flashing a common phenomenon amongst low-income mobile users in their bid to minimize their own call costs. In cash-strapped households, who can sometimes barely afford the cost of a handset, this is one of a set of cost-saving strategies developed by users. By placing a call to somebody’s mobile phone and stopping it before the owner on the other end pick up, a person can leave evidence of a missed call on the handset’s call log. The practice is used in Europe and Asia as well, but not nearly as extensively as in Africa. User communities are known to develop a series of customized coded messages and rules around the practice of beeping.

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<sup>237</sup> Williams R & Edge D, 1996

<sup>238</sup> Donner J, 2008, p9

Although its roots are in behaviors developed in the landline era<sup>239</sup>, the practice has evolved, become more nuanced, and spread more widely in response to the combination of social, economic, and technological conditions most common of the developing world. In the case of beeping there was a sudden growth in resource-constrained mobile users who utilize the inherent technological capabilities of the mobile (the call log and the address book), and the billing structure (pre-paid cards, calling party pays). According to Donner<sup>240</sup> beeping is an example of an ongoing interaction between social practices and technological factors. The interplay between user and technology is intertwined to the point where it is impossible to attribute a clear causality to the growth of beeping. However, adaptive structuration suggests that without both conditions, it is unlikely that beeping would have been so pervasive on mobile networks around the developing world.

Interviews conducted in September 2004 in Kigali, Rwanda showed that all Rwandan prepaid users purchased *access* on a monthly basis for approximately US\$2.50, which represented the minimum outlay per month for the privilege of sending beeps and receiving calls. Skillful beepers could stretch that US\$2.50 far. Donner quotes a media interview of telecommunications expert Andrew Dymond who called this the “*richer guy pays*” rule that he saw to be “*the accepted way of doing business in Africa*”.

For the small or informal business owners in Kigali, Rwanda there are understood, but unspoken rules about when it is acceptable to use beeping in the customer-supplier relationship<sup>241</sup>. Customers usually expect their suppliers to foot the cost of communication. Recognizing the number of a beeper, suppliers who know their customer base well can often judge whether a call back is likely to translate into a financial transaction and therefore worth the cost of a call.

The rules of beeping might differ between different social groups, but the *callback beep* seems to be the most common. Sometimes it can mean something else and Donner<sup>242</sup> categorized these other types of beeps into *pre-negotiated instrumental beeps* and *relational beeps*. A *pre-negotiated instrumental beep* is used to convey a prearranged message for free. An example of this can be an arrangement between two people to meet at a certain point and

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<sup>239</sup> An example of landline users using similar techniques is the placing an operator-assisted collect call, in the hope that the target will either accept the charges or reject them and call back at a cheaper rate.

<sup>240</sup> Donner J, 2008, p7

<sup>241</sup> Donner suggested that the usage patterns of users in Kigali, including beeping, are likely to be similar to those found throughout Sub-Saharan Africa,

<sup>242</sup> Donner J, 2008, p12

the first to arrive will beep the other party to let them know they have arrived at the point of meeting. *Relational beeps* are used like waves where the one party notify the other party purely as a form of making contact and acknowledging the other party, without expecting to be called back.

Both callback and pre-negotiated instrumental beeps can be directly compared to SMS behavior. One can imagine sending an SMS that said, “*Call me back*” or “*Pick me up now*”, however beeping is used instead as a cost saving strategy, since it is cheaper than both a call and an SMS. A beep differs from an SMS because it contains no content. It can therefore not stand on its own without some contextual or relational cues to back it up.

### **5.3.3 Mobile Airtime as Virtual Currency**

Using mobile airtime as a virtual currency is one of the best known examples of user-led innovation in the field of mobile telephony. This innovation was made possible by the introduction of pre-paid mobile phone cards by mobile operators. With banks not providing accessible and affordable financial services in most of Africa, and especially rural Africa, members of households who migrated, small farmers and micro-entrepreneurs have turned to other ways to make financial transactions: using their mobile phone. Using mobile airtime has become a virtual currency as it is used in transactions as a cash substitute. The process is simple: instead of the purchaser of the airtime entering the code that unlocks the airtime on his phone, the code is sent via SMS to the intended recipient of the financial value of the airtime. The receiver can then trade the code for cash with a local merchant who needs the airtime or who can sell it on to somebody else. In essence the airtime is being swapped for cash, therefore becoming a means of exchange, a *virtual currency*<sup>243</sup>.

This creative destruction of the intended use of prepaid mobile airtime has led to the phenomenon that now ubiquitous mobile phone operators, and not banks, are leading a revolution in the delivery of banking services. With migration increasingly being chosen by many members of rural households as a livelihood diversification strategy, sending money home has always been a costly and cumbersome process if official banking channels are used. The absence of any alternative for transferring remittance money over long distances has led to airtime becoming a cash substitute. The family member living abroad or in the urban areas far away from home, purchases airtime online and this airtime can then immediately be

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<sup>243</sup> Pickens M & Richardson B, 2007

transferred to the intended receiver of the fund's phone. The receiver can then either use the airtime, sell it on or purchase goods with it.

One of the drawbacks of swapping airtime for cash is that in most countries, mobile phone users who buy prepaid airtime have to pay a value-added tax and sometimes a telecoms excise tax too. In Kenya, for example, a twenty six percent tax is charged when buying prepaid airtime. Thus, whenever this virtual currency is used, a lot of money is lost to taxes, often making it as expensive as using official banking channels. These additional costs are motivating people, who are price sensitive to the last cent, to rather use the mobile banking services now provided by the mobile operators at a very low cost.

#### **5.4 Creating Value through Mobile Telephony**

As documented in this thesis, it has been found that the service providers that make up the mobile business ecosystem active in rural Africa have endeavored to adapt their offering to be relevant to the local context. Their innovative efforts are ensuring the viability and uptake of their value offerings. Continuous innovation has led to a number of very successful mobile business models and services that are geared towards improving the socio-economic status of rural communities. As a result, users are readily adopting solutions on offer that are assisting them in their income earning activities. In spite of the high levels of illiteracy and lack of experience with digital technology, people are embracing the technology without hesitation. It has also been shown that users are not merely adopting mobile end-to-end solutions on offer to them; they are also devising their own value creating uses of the technology through a process of appropriation. They are successfully exploiting the value potential enabled by mobile telephony to support their income generating activities in positive ways. The next chapter will investigate this value that mobile telephony is contributing within each of the identified strategies for income generation, thereby impacting their livelihood assets.

# *Chapter 6*

## Mobile Business Models: Assimilating mobile telephony into livelihood strategies

### 6.1 Mobile Telephony and Livelihood Assets

Within the principles of the livelihoods approach, multiple causes, multiple influences and multiple strategies are recognized to contribute to the reduction of poverty. It seeks to provide a model of change that can positively impact on the lives of the poor, that is resilient to external shocks, and not over dependent on external intervention. However, external structures and processes play an important role in transforming the lives of the poor, by supporting and enabling the poor to strengthen their own portfolio of assets and strategies to cope with vulnerability<sup>244</sup>.

In describing mobile business models in terms of Normann & Ramirez's concepts of a *value constellation*, it has been stated that value is determined by the value-creating potential provided for the customer in *their* business or *their* home within *their* livelihood strategy. The players in the mobile business arena within rural Africa provide structures and processes with value creating potential for rural communities. It has been shown that the mobile technology and the offering provided by these players are on an ongoing basis being adapted to the rural African environment and the users' need for affordable and applicable applications. It has also been shown that the users have indeed adopted and appropriated mobile telephony through a process of creative destruction to the point where they can potentially create value for themselves, independent of external interventions, in their chosen livelihood strategies. Within the livelihoods approach, this creation of value should lead to the strengthening of livelihood capital assets: financial, human, social, physical and natural.

This section will explore the ways that mobile telephony has been assimilated into rural livelihood strategies to enable value creating activities and its impact on the strengthening of capital streams required for sustainable rural livelihoods. The focus of this research is

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<sup>244</sup> Duncombe R, 2007

primarily on financial capital streams as an outcome of particular livelihood strategies. Research by Souter et al<sup>245</sup> has shown that telephony had very little direct impact on physical capital (resources such as housing, farm equipment and so forth) and natural capital (land, water, trees, crops, wildlife and so forth). According to Carney<sup>246</sup> livelihood capital streams should not be viewed as distinct entities, but as interdependent, with the emphasis on the flexible combinations of and trade-offs between different capitals. Therefore, even though value creation is explored here primarily within the financial capital stream, it is interdependent and in combination with value creation in the other capital streams, particularly social capital.

Several studies have shown that mobile telephony had a significant impact on the growth of social capital. Mobile telephony created new ways to communicate and establish social networks, leading to the creation of social capital. It is generally agreed that high levels of social capital can result in desirable socio-economic outcomes. According to Goodman<sup>247</sup> there appear to be a strong correlation between national levels of social capital, measured in terms of trust, and socio-economic development. In communities, like rural Africa, where there is a lack of access to formalized structures of support such as the legal system or the financial system, social capital may be an even more important concept, because these communities are relying on informal networks instead for their support. Research in rural Tanzania has shown that increased levels of community participation lead to higher household incomes. Community participation also leads to an increase in trust between community members.

The structural element of social capital is social networks, made up of people and the links between them, where these links can be either strong or weak links. Both types are important because strong links can offer support while weak links lead to opportunities. People who have a lot in common and are in regular contact, like close friends and family, have strong links between them. However, the weak links of irregular communication are important in adult life. The reason for this is that weak links provide access to information that can lead to possible social and economic opportunities, potentially creating desirable macro-level outcomes. Mobile phones are enabling people in rural Africa vastly improved opportunities to communicate and establish or maintain weak links with others outside the immediate

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<sup>245</sup> Souter D et al, 2005

<sup>246</sup> Carney D, 1998

<sup>247</sup> Goodman J, 2005

community, like businessmen, tradesmen, teachers or doctors. Previously this type of communication mostly occurred in a face-to-face situation. It was often not possible to communicate as and when required, since it involved traveling to the person, ruling out any immediacy of access to information or communication<sup>248</sup>. The increase in social capital as a result of improved business related communication contributes to the efficient functioning of markets<sup>249</sup>. This, in turn, can potentially lead to an increase in the financial capital of rural communities as they are given access to information, markets and opportunities to participate in entrepreneurial activities.

## 6.2 Enabling Growth of Financial Capital

Surveys on the impact of telephony on economic activities, conducted by Souter et al<sup>250</sup> in Mozambique, Tanzania and Gujarat (India), showed a mixed response. The telephone<sup>251</sup> was considered to have value by a high proportion of users when it came to saving money, by for example being able to substitute transport or postal costs, but most users did not consider it to have value when it came to earning income. Only the more prosperous, educated and successful were finding it valuable in this area. However, literature researched for this thesis have shown that, even though there are presently not many business models that facilitate direct earning income potential from mobile telephony for rural African users, access to mobile telephony is increasingly having a positive impact on the financial capital of rural African communities. Mobile phones are becoming an integral part for creating value in their livelihood strategies, whether that strategy is geared towards agricultural income, or towards the identified non-agricultural income diversification strategies.

All the players in developing the value creating potential for mobile business models in rural Africa are continuously challenged to provide affordable mobile telecommunication solutions, making it more accessible for the poor. This might very well mitigate the warning expressed by Souter et al<sup>252</sup> that the mobile phone may tend to increase the differential in financial capital between the more prosperous and the more marginalized in society.

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<sup>248</sup> Goodman J, 2005

<sup>249</sup> Aldridge & Halpern, 2002

<sup>250</sup> Souter D et al, 2005

<sup>251</sup> Their research for the Department of International Development was not restricted to mobile telephony, but was on the economic impact of telecommunication in general.

<sup>252</sup> Souter D et al, 2005

The impact of mobile phones on rural African communities' financial capital will be explored by looking at the types of income generated through the various identified livelihood strategies and the value creating contribution that mobile phones have on each of these. The types of income are agricultural income and non-agricultural income generated through diversification strategies of rural households; remittance from household members who migrated, wage labor and micro-enterprise activities.

### 6.3 Agricultural Income

Market information and marketing effectiveness are among the crucial issues that can shape the income of rural poor farmers. Improved access to information like market prices, transport arrangements and costs, the demands and locations of buyers and weather forecasts can have a positive, tangible impact on farmers' income<sup>253</sup>. Farmers used to access this information mostly through the broadcast media (radio) and their social networks. Due to the spread of mobile phones to rural areas, and to a lesser extent the Internet, timely access to relevant and accurate information is rapidly expanding as the various players, including users, are continuously innovating to provide new mobile-based services and tools appropriate to the rural context. This is having a positive effect on both the farmers' income and rural markets in general, with a dramatic effect on retail and wholesale pricing, as well as marketing and distribution of agricultural goods. Literature researched provides mounting evidence that mobile phones are empowering rural producers, even though the net effect on the incomes of individual farmers and fishermen might be highly variable. Various case studies<sup>254</sup> have shown local markets being transformed; wastage and price volatility reduced, reduced prices for consumers and improved profits for producers. However, it has been pointed out by international development organizations that the:

*...broader institutionalization of mobile-enabled agricultural markets is crucial for the beneficial effects of these changes to become widespread and sustainable, rather than simply early-adopter opportunities<sup>255</sup>.*

The impact of mobile phones and the value creating opportunities that it provides farmers from rural Africa in terms of their agricultural income will be further explored by looking at

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<sup>253</sup> Eggleston K et al, 2002

<sup>254</sup> Manobi reports positive results in several case studies in Senegal following the implementation of mobile projects for fishermen operating from Dakar, vegetable growers in the Niayes region, and Karya gum farmers in Tambacounda, Manobi Development Foundation, 2008

<sup>255</sup> InfoDev 2007, p4

the effects of information, in general, and pricing information, in particular, on agricultural income. Specific examples geared towards improving agricultural income will be discussed to illustrate the positive effect that it is argued mobile phones have on the sustainability of rural African livelihoods.

### 6.3.1 The Effects of Information on Agricultural Income

It has been pointed out several times in this thesis that the lack of information and knowledge are constraining factors to the livelihoods of the people in rural Africa and it exacerbates their vulnerability. It also has a direct effect on agricultural production and the income that can be generated from it. It has previously been stated that rural African households still depend heavily on the agricultural sector for much of their income. They generate *agricultural income streams* in the form of retained output and the sale of their own crops or livestock. However, generating optimum income from the sale of their crops and livestock require access to efficient, profitable markets.

When markets function well, trade is abundant and farmers can reap the rewards of specialization by producing crops with a demand in the market place. Markets perform well in the developed world because of the free flow of information, however this has not been the case in developing countries and especially not in the rural areas, because of the lack of communication infrastructure. Studies in the developing world have shown that poor transportation and communication infrastructure constrains agricultural productivity and that a lack of information creates inefficiencies<sup>256</sup>. The result of inefficiencies is that farmers produce the wrong mixture of crops, using inefficient technologies, and consumers not receiving the goods they want.

With the rapid expansion of mobile networks into rural areas, communication channels for the dissemination of information are now a possibility. By providing the useful information to farmers, production inefficiencies can be reduced, leading to higher agricultural income streams. A whole region or economy benefits when improved information flow leads to more integrated markets that widely disseminate new techniques, fertilizers, and other inputs to agricultural production.

It is also very difficult to establish the correct price to offer products at without the appropriate information. Aiming to maximize profits they earn from farms, there is the risk that if farmers do not know the correct market price, products are offered at a price that

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<sup>256</sup> Eggleston K et al, 2002, p69, citing Antle, 1983

consumers are not willing to pay for, or that farmers offer their products at too low a price, losing out on potential income. Eggleston et al<sup>257</sup> provide important insights into how crucial it is for the rural African farmers to have access to pricing information for the goods they produce.

It should be pointed out that useful agricultural information is not limited to prices, but includes weather forecasts, quality standards and definitions, information about market channels, crop selection, pest and disease diagnosis, soil analysis and fertilizer recommendations, among others<sup>258</sup>. However, due to the relatively low literacy levels and the fact that SMS is still the primary component of mobile technology being used for disseminating information to farmers, the delivery of complex technical information is ruled out. It is more appropriate for transmitting time sensitive and dynamic information, making it particularly well-suited for the delivery of weather and pricing information.

### **6.3.2 The Role of Pricing Information on Agricultural Income**

Eggleston et al<sup>259</sup> state that in a market-based economy, prices transmit all the information that participants in the economy require to make effective decisions. A producer's decision on what and how to produce is dependent on the producer knowing the price of inputs he must buy and the prices of the outputs he wish to sell. Market prices act as coordinating signals at both the production and consumption sides.

If prices stayed relatively stable from year to year, very little information will be required, because farmers will know what to plant, labourers would know where to work, and all participants in the market will know what to pay for goods, based on experience. However, prices move significantly in response to such forces as variation in supply and demand, extreme weather conditions and changes in tastes and technology. In efficient markets the *Law of One Price* will prevail. This law is an important economic principle that states that *prices for homogeneous goods sold at different locations should be equal, net of transportation costs*<sup>260</sup>. It applies to more and more goods and services as markets become better integrated with producers and consumers in different locations tied together in an information network summarized by one critical piece of information: the prevailing market price.

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<sup>257</sup> Eggleston K et al, 2002

<sup>258</sup> Roberts M & Kernick H, 2006

<sup>259</sup> Eggleston K et al, 2002, p63

<sup>260</sup> Eggleston K et al, 2002, p64

Wide price variation within a geographic area is a symptom of poor information flow. Eggleston et al<sup>261</sup> cites some examples of empirical studies that documented how effectively or ineffectively price information is transmitted across markets. Such an example is the study by Badiane and Shively of monthly maize prices in Ghana from 1980 to 1993. They found that the estimated time to fully transmit a price shock from the central market to outlying markets was about four months. Price adjustments were also found to be asymmetric in Ghana. Wholesale maize prices for producers in local markets responded more swiftly to increases than decreases in central markets.

Eggleston et al<sup>262</sup> studied the nature of market efficiency and price dispersion and the effect that information flow and communication might have on it, looking at rural China, an area with similar levels of under-development as rural Africa. Their guiding premise was that price dispersion would be diminished by the presence of communications infrastructure and specifically telecommunication. They found that villages with access to even the most basic form of communication technology, the landline telephone, experience declines in the purchase price of various commodities and lower future price variability.

In order to maximize the profits they earn from farms, farmers need price information for four important purposes. *First*, the farmer can make decisions on the mixture of crops to produce based on relative price information as well as how much of it. *Second*, price information enables him to purchase inputs like fertilizer when and where they are cheapest. This enables him to produce in a more efficient manner. *Third*, prices allow him to know where to sell his output and what prices to accept. Often prices differ from village to village and can be higher in urban markets due to shortages of a particular product. By only knowing the local price he would not realize that it might be profitable to adjust his output. He misses opportunities to earn more income by not sending his output where they are valued most. There can also be highly variable pricing across different cities, but without proper communication channels price-seeking forays could take considerable time and costs.

High pricing search costs due to poor information opens the market for middlemen or dealers. A lack of information continue to disadvantage the farmer because he cannot independently assess the integrity of the dealer or the prices being offered, by being able to compare

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<sup>261</sup> Eggleston K et al, 2002, p64, citing Badiane and Shively, 1998

<sup>262</sup> Eggleston K et al, 2002

purchase prices across many dealers and markets. Preventing the exploitation by middlemen is the *fourth* purpose of price information for farmers.

Knowing the price of goods before making production decisions will make agriculture far more profitable for the African farmers. However, Eggleston et al<sup>263</sup> point out that not even farmers in the information-rich environments of developed nations know the ultimate sales price before they produce, but they can make informed assumptions through price projections and futures markets.

Roberts & Kernick<sup>264</sup> also point out that different sources of price information have different levels of accuracy and reliability. At the one end, the most reliable price information that a farmer can obtain is the actual price that is negotiated between him or her and the buyer in the moment of transacting. At the other extreme end is the price information received from an agricultural market information system, which cannot take in consideration factors like distance, small variations in quality, the relationship between the buyer and seller and the rapid supply- and demand-driven prices variations. Between these extremes are farmers' personal networks, like trusted neighbours, who have recently negotiated prices for themselves. They can report on price information that is richer in detail and similar to what the farmer may expect to obtain himself.

Therefore, even with access to sophisticated agricultural market information system, social networks remain an important and reliable source of information for farmers<sup>265</sup>. However, these prices are mostly reliable if farmers are price-takers, giving farmers an indication as to what price he can expect to be given. The only time where they are able to negotiate prices is when there is a shortage of good quality crops and they have a multitude of buyers vying for their produce. By following price trends, producers can be aware of when such a trend is developing. Agricultural market information systems, being consistent sources of information, are able to create this awareness of not only short, but also long term trends. Given the consistency of the price information of these systems, farmers should over time be able to estimate the prices they can receive, by correlating the prices they actually receive to the reported prices. This will enable them to understand the impact of price variables

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<sup>263</sup> Eggleston K et al, 2002, p68

<sup>264</sup> Roberts M & Kernick H, 2006

<sup>265</sup> Mobile phones positive contribution to strengthening these social networks is discussed elsewhere in this paper.

introduced by factors like quality of crops, distance to market or costs incurred to middlemen, thereby supporting decision-making for profit improvement.

### **6.3.3 Mobile telephony in support of Agricultural Income**

If a community has access to ICTs facilities, is information literate and has ongoing access to up to date information, it can participate in the global information society<sup>266</sup>. Mobile phones could potentially give rural dwellers in Africa the ability to be part of this information society by giving them access to the same agricultural information as their counterparts in developed societies of the North. This will allow them to adopt global best practice and adapt it to local realities. There are several projects in place that are showing great promise in delivering the intended value of an increase in agricultural income streams for African rural communities. Following are examples of such projects that can potentially be replicated in other African rural communities.

The Kenya Agricultural Commodity Exchange (KACE) is a private sector company that harnesses ICTs for rural value addition and empowerment<sup>267</sup>. They use ICTs to facilitate linkages between sellers and buyers of agricultural commodities, provide relevant and timely marketing information and intelligence as well as provide a transparent and competitive market price discovery mechanism. They also run an SMS-based information service, *SokonoSMS*, for farmers. This service enables farmers to receive up to date market prices directly to their mobile phones from the various fresh produce markets around the country. Mobile phone users just send a short text message to retrieve the market price they are interested in for the various markets. This information enables them to determine the most profitable market centre to transport their produce to, bypassing the middlemen who usually offer to buy the products at much lower prices. This service enables the farmers to earn more money without necessarily increasing output, thereby increasing the profitability of farming.

Manobi-Senegal aims to assist in the fight against poverty by providing farmers and fishermen with leading edge technologies and services that can make their businesses cost-efficient. They provide a trading platform as well as up to date pricing information for farmers. From case studies, Manobi reports that thousands of small vegetable growers from the Niayes region in Senegal have increased their net revenues by over US\$2,200 per hectare per year. Dozens of very small-scale farmers bundle their produce to supply the large clients

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<sup>266</sup> Charles-Iyoha C, 2007

<sup>267</sup> Mungai W, 2005

directly and have been able to triple their average revenue as a result. Today, being directly linked to purchasers, they carry out individual transactions that guarantee a turnover of over US\$3,000 per week. They no longer have to bear heavy losses in term of time and transport fees in order to travel to markets, where they often incurred further losses by receiving low prices for their perishables, due to a lack of market information. Some farmers who are making use of Manobi's services have reported up to six hundred percent increase in revenue.

In 2007 Manobi implemented a project for Wula Nafaa, a USAID Agriculture/Natural Resource Management organisation, which developed the concept of information dissemination further<sup>268</sup>. They developed a system to enable a core association of fourteen Karaya gum farmer cooperatives in rural Tambacounda, Senegal, to create and manage their own online information system, accessed by mobile telephone. Karaya gum, only grown by Senegal and India, is exported to the United States and European Union for manufacturing cosmetics and pharmacology. The Karaya producers were the weakest link in the chain of supply and demand, loosing a lot of business to India. Ten thousand producers in Senegal suffered a total absence of access to information and product news. They did not have the ability to communicate with purchasers and foreign manufacturers or with one another in order to establish commercial norms. Downstream, the absence and distortion of reliable information meant that manufacturers could not project the future price and supply of Karaya gum. Besides providing information and dynamic pricing to producers, the system also enables speeding up of the time to market by providing information remotely to karaya buyers. Representatives from the cooperatives collect supply data with PDAs and communicate with producers to fulfill orders. The ongoing interaction with high volume buyers creates a responsive supply chain.

The multi-platform system, which can be remotely accessed by the producers of Karya gum using their mobile phones, has enhanced the effectiveness of these producers as cooperatives, making them more competitive and giving them direct access to the international market. Agricultural intensification has therefore finally become a viable livelihood strategy for these producers who, prior to the intervention by Wula Nafaa, used to sell their gum to the local collectors, who often also used to be local store owners. Because they had advanced food to the producers, they could buy the gum for very low prices, as producers wanted to clear their

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<sup>268</sup> Manobi Development Foundation, 2008

debts. With their dramatically increased revenues they are now able to buy ploughs and seeding machines<sup>269</sup>.

Another well-documented case study is the Manobi project aimed at the fishing industry in Senegal<sup>270</sup>. In this project fishermen are provided with fish market prices and weather reports in real-time, fish stock information, boat departure times and the estimated return times. The pricing data is collected in each of three markets, using PDAs, and transmitted to a central database for access by WAP (Wireless Application Protocol) enabled phones, by SMS or web. Hundreds of small-boat fishermen, having adopted the Manobi system, are now able to select which port or beach to unload their catch on by consulting their mobile phones for information on fish market stocks and prices. This enables them to secure a higher price from middlemen. In the fishing sector, Manobi users have increased their sales by thirty percent. This is significant for the country, since the fishing sector represents ten percent of the Senegal's GDP<sup>271</sup>. With mobile phones enabling them to alert potential buyers (middlemen) as soon as they have landed their catch, the quality of the fishermen's offering has also improved. Typically up to thirty percent of their catch may be wasted while the fishermen wait for a buyer.

Apart from the information that the fishermen can access using the Manobi system, they also log their departures and estimated times of return on the system, so that local fishing unions can be alerted, via their extranet web site and SMS, if fishing boats fail to return on time. The Senegalese artisan fishing fleet casts its nets in the Atlantic during the night, sometimes as far as forty kilometers out to sea in long open canoe-type boats. Fishermen can broadcast messages and efficiently respond to other fishermen's messages if they are within the fourteen kilometers range of the base station on the beach. Manobi's S.O.S. system has saved many lives and family livelihoods. It can pinpoint the exact location of a vessel in distress as well as alert the nearest boats for the rescue. Combined with access to real-time weather reports, the safety for fishermen operating from the capital Dakar and the nearby town of Kayar have been greatly improved.

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<sup>269</sup> It is reported by USAid that since the intervention of WULA NAFAA (a USAid funded incentive), which focuses on promoting and increasing trade by creating links directly between farmer and exporters, that revenues increased by 92 percent. The Manobi project is integral to the success of maintaining these links.

<sup>270</sup> Manobi Development Foundation, 2008

<sup>271</sup> InfoDev, 2003

By recording detailed information about daily catches, the resulting database will also be a useful resource in monitoring fish stocks, which are being over-fished in the immediate area, by both local fishing and vessels from developed countries. This can help the fishermen in the future as the data can be used to help them and their representatives to present a strong case for protecting the natural resources on which the fishermen depend for their livelihoods<sup>272</sup>.

Even though they are not part of an integrated information distribution system, it has been reported that fishermen in Ghana have also benefited enormously from mobile phones to the extent that it is now seen as one of the essential tools making up their fishing equipment. Without the ability to communicate beyond their immediate community in advance to establish the most competitive prices and demand for their catch, they found themselves at the mercy of some unscrupulous middle women fishmongers. They often used to dump their catches back into the sea to avoid selling them at rock-bottom prices<sup>273</sup>.

The ability to communicate with customers also help rural producers to mitigate the risks and difficulties that a general lack of infrastructure in rural areas add to their efforts for an income production. Without access to electricity, women who fish along the Congo river can not freeze the unsold stock from their daily catch. The surplus fish therefore had to be thrown away if buyers were not found in time, creating unnecessary waste, but also sacrificing potential income. Having acquired a mobile phone one woman tells how she now takes orders for fresh fish from her customers. She keeps the fish alive in the river, tethered to a string, and only retrieves them to prepare them for the sale once she receives a phone call or an SMS for an order. This means that there is no wastage and all the fish caught by her can potentially lead to a transaction, increasing the income from her fishing activities. She is now also able to guarantee the freshness of her stock, thereby providing an improved customer service<sup>274</sup>.

Apart from market information and marketing effectiveness, it is crucial for poor farmers to have access to reliable markets where they can sell their surplus crops at competitive prices. The United Nation's World Food Programme (WFP)<sup>275</sup> has recently launched an innovative project, Purchase for Progress (P4P), in collaboration with the Bill and Melinda Gates Foundation and the Howard Buffett Foundation. US\$76 million has been committed to

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<sup>272</sup> InfoDev, 2003

<sup>273</sup> Charles-Iyoha C, 2007

<sup>274</sup> LaFraniere S, 2005

<sup>275</sup> World Food Programme, 2008

transform the way the WFP purchases foods in developing countries<sup>276</sup>, with a special focus on Sub-Saharan Africa and Latin America. Innovations in the WFP's local food procurement practices, which are central to the agency's new business model, aim to strengthen the role of smallholder and low-income farmers in agricultural markets and enable them to gain more from supplying food to the WFP's global operations. By supporting small farmers' ability to produce and supply food to the WFP's global operations, P4P aims to help small-scale farmers to become net producers rather than net consumers. As a public-private partnership, it is not clear from current literature available on this exciting programme whether they will implement grassroots ICT solutions. Based on evidence provided in this thesis on mobile telephony's value adding role for agricultural income production, this P4P project provides immense opportunities to implement supporting mobile solutions for maximum value creation for poor farmers.

## **6.4 Non-Agricultural Income**

### **6.4.1 Income through Remittance Transfers**

Migration is seen to be part of a broader household livelihood strategy to diversify income sources and overcome social, economic and institutional development constraints in places of origin<sup>277</sup>. Studies in Somalia showed that more remittances were sent from abroad when families experienced a decline in fortunes, leading to the conclusion that families receiving regular remittances were better protected from income shocks caused by economic downturns, political conflicts or climatic extremes. Remittances also contribute to household of origin's welfare, nutrition, food, health and living conditions. In addition to its contribution to more stable and secure household livelihoods, remittances also play a vital role in providing a potential source of investment capital, which is especially important in developing countries where credit facilities are often inaccessible to non-elite groups. It potentially enables households to invest in productive activities to improve their livelihoods. Remittance as investment capital is typically used for entrepreneurial activities, education or to facilitate the migration of other household members. Studies conducted in Burkina Faso and Morocco in 2006 suggested that it was only migration to Europe that allowed families to accumulate substantial wealth, whereas internal and international migration within the

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<sup>276</sup> The WFP is the world's single largest purchaser of food for humanitarian operations. In 2007 the agency spent US\$612 million on food in developing countries. (*Source: World Food Programme, 2008*)

<sup>277</sup> De Haas H, 2007

African continent led to relatively small gains, only providing income diversification possibilities<sup>278</sup>.

National cyclical urban-rural migration is a prevalent livelihood strategy of rural African households. However, money transferred between family members in national migration is not usually looked at in empirical studies on remittances. Workers remittances are generally understood to be the earnings sent by migrants from abroad to relatives in their country of origin to meet economic and financial obligations. The International Monetary Funds (IMF) refers to workers remittances as *personal remittances*. They measure and analyze international remittances using three categories: *personal remittances*, *total remittances* and *total remittances and transfers to nonprofit institutions serving households*<sup>279</sup>. However, countries do not apply the concepts of remittance uniformly, nor do they capture monetary flows outside formal financial channels. Data deficiencies and omissions therefore cloud the picture of remittance flows, but from research reported by De Haas<sup>280</sup>, it is clear that there has been a striking increase in international remittance flows as a result of migration over the last fifteen years and it is only likely to continue to rise. He reports that registered remittances have risen from US\$31.1 billion in 1990 to US\$167.0 billion in 2005, now representing double the amount of official development assistance given to developing countries. It is also ten times higher than net private capital transfers to these countries<sup>281</sup>.

The IMF reported the recorded remittances for Africa in 2003 to be in the region of US\$20 billion and that of Sub-Saharan Africa as US\$10 billion, amounts larger than foreign direct investments in Africa. According to the United Nations' Office of the Special Advisor on Africa, the average African migrant living in a developed nation is sending US\$200 per month home to his or her family.

It is believed that the official data on remittances is severely underestimated, but there is little agreement on the size of the undercounting. Some studies estimate unrecorded remittances to be two and a half times the size of recorded remittances reported in the 2005 in the IMF's balance of payment data. Sub-Saharan Africa has the highest share of unrecorded remittances, with estimates of the size of informal, unrecorded remittances up to 85 percent

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<sup>278</sup> De Haas H, 2007 citing studies by De Haas, 2006 in Morocco and Wouterse , 2006 in Burkina Faso

<sup>279</sup> World Bank, 2007 citing from the International Monetary Fund Committee on the Balance of Payments Statistics, 2006, *Definitions of Remittances*.

<sup>280</sup> De Haas H, 2007

<sup>281</sup> De Haas H, 2007

of formal flows<sup>282</sup>. This may reflect the fact that in many African countries using informal channels are common due to limited formal financial infrastructure, especially in rural areas<sup>283</sup>. African migrants from rural areas and their families have remained mostly outside the formal banking system, with non-traditional means the only option for them to send capital home. This will often involve delivering cash in person or through social networks to rural areas, involving a high degree of risk. Another popular informal system used in Africa is the *hawala* system, where transactions take place entirely on the honor system between global networks of hawala brokers. The sender pays the money to be transferred to the local hawala broker who contacts a broker in the recipient's location, who pays the money over to the recipient for a small fee. The two brokers settle accumulative debts between themselves, but no records are kept of individual transactions<sup>284</sup>. This system is extensively used by the Somali diaspora where, due to the ease of communication facilitated by the mobile telecommunication network, recipients can receive the cash in Somalia within minutes of the transaction being concluded<sup>285</sup>.

Informal systems requires a high level of trust that the money will actually be delivered in full to the intended recipient. However, people are willing to take these risks because conducting transfers through formal banking systems can lead to long delays and the service charges are disproportionate to the amounts sent home, mostly because of the relatively low volumes and lack of competition in international money transfers for Africa. A few money transfer operators (MTOs), such as Western Union, Postapay and MoneyGram, dominate the international money transfer market.

Even though cash-to-cash is still the dominant model and accounts for ninety percent of the market, literature researched reported an enormous surge in innovation applied to solve the problems with remittance replete with new technologies. Some of the more successful solutions are those that are rapidly developing around the abilities provided by mobile telephony, allowing migrants to not only send money home, but also goods. The technology

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<sup>282</sup> A World Bank study in 2003 estimated informal remittances in Sudan to be 85 percent of total remittance receipts. Page and Plaza, 2006, estimated unrecorded remittances in sub-Saharan Africa to be 73 percent of recorded remittances.

<sup>283</sup> Page and Plaza, 2006

<sup>284</sup> The US government do not trust the hawala system, viewing it as a vehicle for money laundering, tax evasion and funnelling money to terrorist organizations

<sup>285</sup> CBC News Online, 2004

that facilitates money transfers via mobile phones is the only technology with truly disruptive qualities<sup>286</sup>.

- **Remittances using M-Payment Systems**

With an ever-growing subscriber base in the developing world, including rural Africa, mobile telecommunication technology provides remittance recipients with an ubiquitous electronic payment infrastructure where none has historically existed. With this infrastructure in place, remittance recipients not only receive funds at any time and any place, but they can perform a number of other types of mobile payment transactions due to the funds transferred to their mobile wallet. Mobile remittance and m-payments have great potential due to well-tested encryption technology and the wide adoption of solutions already in place providing formal and informal methods of utilizing mobile phones for financial services. Using the concept of an M-Wallet, the various M-payment systems available enabled an increase in competitiveness in the money transfer market, providing a cost effective, timely and low risk service.

Kenya was identified by an IMF report as the second biggest recipient of foreign remittances in Sub-Saharan Africa after Nigeria, making it a very important source of income for local households. Safaricom, a leading mobile phone operator in Kenya with some five million customers, enables subscribers to remit large volumes of money in an instant transaction using their mobile cash transfer service, M-Pesa. However, for now, their services are only available for money transfers within Kenya and is widely used by urban migrants for sending money to their rural households of origin.

A typical example of urban-rural remittance is the case of David Omuchilili, a security guard in the town of Ngong, outside Nairobi<sup>287</sup>. He uses his mobile phone to send a portion of his modest wages to his wife and five children in a village two hundred and ninety kilometers away. He pays cash to an agent for M-Pesa, who is also a mobile phone dealer. The agent sends a code number via a text message to Omuchilili's wife. She uses the code to redeem cash from an M-Pesa agent close to her home. He used to travel home to take her money, whereas now he can send her money when she needs it without spending money on traveling.

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<sup>286</sup> Cellular News, 2008. Article quoting a Celent report by Red Gillen, senior analyst with the Celent Banking Group

<sup>287</sup> Ewing J, 2007

The service costs an average of US\$1 to send or receive money. To operate the M-Pesa account requires a SIM card that has a money transfer menu that allows account funds to be managed. A typical transaction starts with a Safaricom subscriber registering with an M-Pesa agent with proof of identification. Their phones are then activated to reflect that they are M-Pesa subscribers. In order to send money, the subscriber has to deposit the amount at any M-Pesa outlet. A message is sent to the recipient's mobile phone, advising him to collect the amount at any dealer shop. The sender is given a secret PIN number to communicate to the recipient if the money is sent to somebody who is not registered with M-Pesa. The recipient can collect the money from any M-Pesa agent by identifying themselves and presenting the PIN number.

In an effort to expand the possibilities of money transfers across East Africa, the company has joined forces with other mobile providers in Tanzania and Uganda. Safaricom, through their parent company Vodafone, also started trials in the United Kingdom (UK) in August 2007. Plans to extend the services of M-Pesa in the UK beyond the trials, with their banking partner Citibank, has been delayed because of the difficulties experienced to meet the regulatory requirements governing banking, money transfers and exchange rates required to be allowed to enter the lucrative market of international money transfers<sup>288</sup>. It is therefore not easy for innovative mobile operators in Africa to extend their financial services to their subscribers into the heavily regulated financial environment of the developed world. Instead, global players who already have banking partnerships and regulatory requirements in place, are moving into the African market to provide international remittance services, like Mi-Pay<sup>289</sup>.

The Western Union Company, a global leader in money transfer services, also entered into an agreement with the GSMA<sup>290</sup> to facilitate the development of cross-border mobile money transfer services. Western Union and the GSMA are developing a commercial and technical framework that mobile operators can use to deploy services that enable their subscribers to send and receive low-denomination, high frequency money transfers using their mobile phones. The Western Union mobile service will connect operators to Western Union's existing global money transfer system. Once connected to the Western Union service,

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<sup>288</sup> Aron M, 2008

<sup>289</sup> Lloyd-Jones T, 2008

<sup>290</sup> A global trade association representing over 700 GSM mobile phone operators, including operators from Africa.

operators will be able to use their own mobile wallet software to enable person-to-person mobile money transfers over Western Union's cross-border remittance network. The Mobile Money Transfer service will enable consumers to transfer money to or from mobile wallets and will offer a global network of Western Union Agent locations for cash-to-mobile and mobile-to-cash transactions<sup>291</sup>. They currently have in the region of 10 000 agents in Africa. With the increase in competition for money transferrals it was reported that, in the forty-six African countries served by Western Union, money can be sent for half the price it cost in 2006. Up to a US\$100 can be sent from a major market to Africa for as low as US\$8.50<sup>292</sup>. All savings lead to potentially more money in the pockets of households receiving the remittances and more money invested in the local economy.

- **Remittances in terms of goods**

Ingenious remittance solutions are being developed to transfer goods to the families of migrants, making use of the Internet and mobile phones. Members of Zimbabwe's diaspora can make use of the online services provided by Mukuru on their website mukuru.com<sup>293</sup>. A variety of goods and services can be purchased online, to be delivered in Zimbabwe through Mukuru's network of agents in that country. Items that can be purchased on behalf of relatives include fuel, food parcels, fresh meat, mobile phones and airtime<sup>294</sup>. Users can also purchase Mukuru Greenbacks, which enables them to send US Dollars or South African Rands to recipients, collectable in these foreign currencies as the local currency is continuing to devalue amidst hyperinflation. Upon confirmation of the secure online payment, a Mukuru Voucher with a ten-digit code is sent via SMS to the recipient's mobile phone, which has to be shown at the point where the voucher can be redeemed for the paid services and goods. By July 2007 Mukuru had about 10 000 registered users of their services, but they are expanding fast, with plans to provide similar services for Kenya, Malawi and Zambia.

Mama Mike's, a pioneer in goods remittance, also offers online shoppers on their website mamamikes.com the ability to buy supermarket vouchers, gifts and mobile phone airtime for relatives in Kenya and Uganda<sup>295</sup>. Sending airtime remains a popular way for migrants to

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<sup>291</sup> Western Union Press Release, 2007

<sup>292</sup> Gitaa T, 2007

<sup>293</sup> Mukuru, 2008

<sup>294</sup> Zimbuyer.com provides a similar service as mukuru.com, with a larger variety of items on offer. However, their business model does not incorporate extensive use of mobile phones in the delivery process of purchased goods, making it purely an e-business model.

<sup>295</sup> Mamamikes, 2008

transfer remittance to their relatives in small amounts at a time, allowing recipients to either use the airtime, make transfers to other accounts (credit swapping) or to convert it to cash. This form of remittance, which is effectively online shopping, is fast and effective as the transaction between the purchaser and the recipient of the goods or services can be concluded in a matter of minutes. It also addresses the issues of safety, costs and misuse, often associated with other forms of informal channels for remittance transfers.

#### **6.4.2 Wage Labour**

Landless labourers, who together with farmers make up the majority of the population of poor rural areas, mostly find work in the informal sector. Most employers' needs vary greatly from day to day and are unpredictable. This leads to very low productivity for these laborers as they spend a lot of time waiting at pick-up points in hope of employment for the day. They often miss out on income opportunities elsewhere because they lack the information. This leads to uneven labour supply where workers in one village may stand idle while employers in nearby villages or urban areas are unable to find enough workers. Mobile phones can contribute to establishing the kind of social networks that can spread word-of-mouth information on casual labour opportunities in the informal sectors.

As far as employment in the formal sectors goes: field observations conducted by Samuel et al<sup>296</sup> have shown that mobile phones were essential for searching for work, not only for getting information and making an application, but also as a means of being contacted by a prospective employer.

One World's Kazi560 in Kenya is an example of a job-brokering service that notifies their subscribers of employment opportunities via SMS<sup>297</sup>. Even though its more than 300 000 subscribers have to pay a subscription fee, they see value in paying for the service that has filled more than 60 000 jobs since its launch. Subscribers can query the database by sending an SMS, typing the job category as a search filter. Job-brokering services, made accessible by mobile telephony to rural job seekers, provide valuable information on job opportunities for those who are considering urban migration.

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<sup>296</sup> Samuel J et al, 2005

<sup>297</sup> Kazi560, 2008

### 6.4.3 Micro-enterprises

Nowak defines a micro-enterprise as an entity that employs less than five people and generates income from non-farm production, services and trade<sup>298</sup>. The private sector in Africa is ninety percent made up by rural and urban micro-enterprises, thereby forming the true private sector. Rural micro-enterprises in Africa, where they are almost exclusively informal, make a valuable contribution to growth, while ensuring a more equitable distribution of income. Micro-enterprise represents a viable route out of poverty through increased and more diversified income streams for poor households<sup>299</sup>. Through micro-enterprise activities livelihoods are enhanced by reducing risk and vulnerability, by strengthening financial and non-financial assets, and promoting social and economic empowerment<sup>300</sup>.

A distinction can be drawn between those micro-enterprises that are survivalist and those that are entrepreneurial<sup>301</sup>. When it comes to factors that necessitate income diversification for the communities of rural Africa, Ellis<sup>302</sup> distinguishes between *pull* and *push* factors, where people are either *pulled* by opportunities or *pushed* by a lack of opportunities elsewhere. Due to a lack of other income-generating activities, survivalists are usually *pushed* into enterprise. They make up the majority of micro-enterprise in developing countries and are commonly referred to as the *informal sector*. They are typically unregistered or unlicensed and are mostly run out of houses. Females entrepreneurs dominate in more survivalist activities such as the production and selling of crops, fruit and vegetables, beer, craftworks, clothes and food. These are generally low-income activities.

Entrepreneurs, on the other hand, are *pulled* into enterprise by opportunities for income generation and growth. These enterprises are dominated by males and tend to include more diversified activities such as making and selling of furniture, blacksmithing, metalwork, vehicle repairs, taxi services, building and plumbing. They have a higher income and employment-generating potential and also tend to experience higher growth. Entrepreneurial micro-enterprises therefore have higher poverty-reducing potential than survivalists, since the informal sector is usually oversubscribed and profit margins are very small. Entrepreneurial

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<sup>298</sup> Nowak M, 1989, p58

<sup>299</sup> Duncombe R, 2007

<sup>300</sup> Ellis F, 2000

<sup>301</sup> Duncombe R, 2007

<sup>302</sup> Ellis F, 2000

micro-enterprises are more likely to interact effectively with local or distant markets and their owners are more likely to have the skills required to identify and exploit market opportunities<sup>303</sup>.

Rural households are often involved in micro-enterprise activities as part of a livelihoods strategy of income diversification, in order to supplement income<sup>304</sup>. However, the largest proportion of their income is still gained from a wider portfolio of traditional sources: agricultural income through the sales of crops and livestock and non-agricultural income through wage labour, social grants or remittance income. They might step in and out of micro-enterprise activity, depending on the nature of the activity, seasonal demand, availability of resources and other personal and social factors<sup>305</sup>.

The profitability of micro-enterprises in rural Africa is greatly influenced by informational challenges. The absence, uncertainty and asymmetry of information shape the characteristics of supply chains, keeping them localized and intermediated. The three typical characteristics identified for trade within the micro-enterprise supply chains in most of Africa are that they are slow, costly and risky. Since these tend to be proportional to distance, there are incentives to localize supply chains. Local, informal networks are important to access local customers. However, Duncombe<sup>306</sup> refers to evidence showing that too much reliance on local networks can restrict entrepreneurial activity. Micro-enterprises who wish to expand their supply chains or extend their market reach to urban areas, have greater information needs, for example information concerning formal credit facilities, market prices within urban areas and availability of inputs of raw materials and technologies from further afield.

Where supply chains are not localized, intermediaries are often used. Intermediaries handle the trade between producers and smaller traders or consumers. They can address some of the negative information-related characteristics of trading, because they usually hold both quantitative and qualitative information on buyers, sellers, products and prices. They can reduce the cost and speed of access to information and thereby potentially reduce the risk of trading for buyers and sellers. However, they reinforce the problem of information asymmetries, which places them in a more powerful position - they know things that micro-producers and customers do not. As a result, they often manipulate prices and thereby

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<sup>303</sup> Duncombe R, 2007

<sup>304</sup> Havnevik K et al, 2007

<sup>305</sup> Ellis F, 2000

<sup>306</sup> Duncombe R, 2007

reducing the income of others in the supply chain. Micro-entrepreneurs are also often beholden to these intermediaries with unfair terms of credit, due to a lack of other financial support structures.

- **The potential impact of mobile telephony on micro-enterprises**

For the poor, sufficient trust to justify decisions is created predominantly through personal contact, interaction and, usually, a shared context and proximity to the information source. Mobile telephony can serve to reinforce trust, confidence, and security by helping to break down the insularity of entrepreneurs' social networks. This can assist micro-enterprises to break away from being mainly survivalist entities to becoming more entrepreneurial.

Mobile telephony may provide an opportunity to address the informational challenges and therefore, alter the characteristics of trade within micro-enterprise supply chains<sup>307</sup>. Mobiles could have a quantitative impact by increasing the speed of communication and by reducing the cost of communication. It can facilitate the expansion of social networks, thus forging linkages to sources of formalized and better-quality information that can serve to strengthen both socio-cultural and socio-political assets<sup>308</sup>. An increase in the quality of information also has a qualitative impact on decision-making.

In turn, the three characteristics (slow, costly and risky) identified of supply chains in rural Africa will also be impacted by mobile telephony. As the speed of communication and information gathering necessary for trading increases, trading can become quicker. By reducing information asymmetries and uncertainties, risks can be reduced. It also provides ways in which costs can be reduced and time saved because mobile communication can often substitute journeys. However, it must be noted that the need for journeys and physical meetings continue, due to issues of trust, design intensity, physical inspection and exchange and interaction complexity<sup>309</sup>.

Supply chain structures can also be altered, allowing a greater locational spread of micro-enterprise activity<sup>310</sup> and making micro-entrepreneurs less reliant on intermediaries. Buyers and producers can communicate directly by mobile phone, even if there are great distances involved. This will erode the information advantage offered by intermediaries and empower

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<sup>307</sup> Jagun A, et al, 2007

<sup>308</sup> Duncombe, 2007

<sup>309</sup> Jagun A, et al, 2007, Overå R, 2006

<sup>310</sup> Overå R, 2006

micro-entrepreneurs. At the macro-level, the positive outcomes of access to mobile telephony have the potential to help increase business investments, allow new businesses to emerge, and contribute overall to economic development<sup>311</sup>.

This contribution will be further explored by looking at various streams of micro-enterprises: mobile service providers in rural areas, trading and manufacturing.

- **Micro-entrepreneurial Activity: Mobile Service Providers**

The growth of the mobile industry into rural Africa has opened up many opportunities for rural communities to participate in entrepreneurial activities providing mobile services to their local communities. The mobile industry therefore has a direct economic impact on these entrepreneurs' livelihoods, while the services provided by these entrepreneurs enable the indirect impact of mobile telephony's value creation potential for the communities they operate in<sup>312</sup>.

The much-lauded Village Phone Programme of Grameen was replicated in Uganda by MTN, in partnership with the Grameen Foundation<sup>313</sup>. By 2007 there were 13 000 small-time entrepreneurs taking part in the project. The village of Wabusana, a three-hour journey to cover the potholed eighty-kilometer drive from Kampala, supports four village phone operators. Their stories illustrate how the spread of mobile telecommunication is providing livelihoods for thousands of Africans. Hasifa Nakitio feeds her extended family of eleven children with income from the village phone and by peddling cups full of matoke, a mashed-potato-like dish, to customers. She is left with enough income to be able to save for a plot of land and her own house.

Ezeresi Serukeera, a mother of four who runs her village phone in Wabusana from a crude wooden booth, had to get a loan of about US\$385 to buy the phone gear required to run her business. Serukeera managed to pay the loan back in six months and could afford to spend some of her income on enlarging her house. She also serves as a kind of local banker, a conduit for relatives in Kampala to send money home to their families. These people transfer

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<sup>311</sup> Jagun A, et al, 2007

<sup>312</sup> Applying the types of economic impact of mobile telephony as per McKinsey's definitions (*Source: McKinsey and Company, 2006*)

<sup>313</sup> MTN took full control of the operation in 2006

airtime to Serukeera electronically, and she passes on the equivalent in cash minus a small commission, then resells the airtime minutes to other callers<sup>314</sup>.

The MTN Nigeria Foundation (MTNF) implemented a programme similar to the Village Phone Programme, the MTNF Rural Telephone Project, where women are given mobile business opportunities by providing them with a microloan and a business plan. The “phone ladies” are trained and equipped to provide call services to members of their community for a fee. The cost of their business set-up is converted to a loan. This loan, which enables them to acquire the mobile phone, MTN starter pack, recharge cards, promotional material (umbrella, banner, wind waives, t-shirts and caps), antennae and battery pack required to set up a call centre in their community, is payable over a ten-month period. The loan repayments are used by the foundation to extend the project to other rural women. Apart from loan repayments, beneficiaries are also expected to pay a refundable insurance fee and set money aside for savings. At the end of the pilot project, with an initial 155 phone ladies, the project recorded a hundred percent repayment of loans.

With an average income of US\$120 per month, these ladies have been able to increase their monthly income by 400 percent, enhancing their social status. The foundation reported that they have also seen an increase in the productivity levels of the community due to easier access to telecommunications services<sup>315</sup>. This programme won the Best Mobile Community Service 2006 GSMA award because it is an excellent example of how providing rural women with entrepreneurial opportunities around mobile services have resulted in socio-economic empowerment, transformation and sustainable livelihoods. It was foreseen that the project will be extended to over 3 000 beneficiaries all over Nigeria, with the objectives of providing first class GSM service in the rural communities, alleviating poverty and empowering women<sup>316</sup>.

This business model, where women are provided the ability to become vendors of mobile phone services, from selling airtime to battery charging services and providing public phone services, has been very successful in empowering the poorest women in the villages. Their earnings not only ensure the sustainability of their businesses, but also go a long way in meeting strategic family needs such as educational fees and healthcare expenses<sup>317</sup>. These

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<sup>314</sup> Ewing J, 2007

<sup>315</sup> Oyagbola A, 2007

<sup>316</sup> Charles-Iyoha C, 2007

<sup>317</sup> Charles-Iyoha C, 2007

women provide access to global communication, thereby causing ripples in the highly stratified villages, as even the relatively richest people in the villages require these poor women's services<sup>318</sup>. Since it is mostly the men who go to cities for work or trade or even foreign countries as migrant workers, the phone services are being retailed in the villages almost exclusively by women. The women left behind are now able to keep contact with their men traveling or residing elsewhere.

There are many anecdotal examples of people creating an income for themselves by providing mobile services without being part of a particular network's business model. The deputy manager of Vodacom's Congo<sup>319</sup> operations related the story of people in the two jungle provinces of Congo being so eager for mobile telecommunications services that they built fifteen meters-high treehouses to catch signals from distant cellphone towers. Some operated it as public pay phones, charging people to climb their platforms and make calls. Other examples are of mobile phone owners charging people in the community a small fee for making phone calls on their phones and delivering messages to them. Others make an income from providing mobile repair services or handset recharging services, using car or truck batteries.

- **Micro-entrepreneurial Activity: Trading**

According to Overå<sup>320</sup>, in Sub-Saharan Africa transportation costs and transaction costs are the two major factors that determine traders' producer-wholesale margin, affecting the income of both producers and traders and, ultimately, the availability and cost of goods for consumers. Transportation costs are not only the price of moving goods from producer to consumer, but also include the cost of transporting people in order to exchange information. Transaction costs arise because information is costly and asymmetrically held by the parties of exchange. Transportation costs and transaction costs are intrinsically linked, as a previous lack of access to telecommunication and inadequate means of transportation made transactions more risky, while increasing the costs to traders to gather information on potential trading partners.

There are usually a series of trading activities along the micro-enterprise supply chain. In order to succeed, traders have to trust and rely on cooperation with other traders as well as

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<sup>318</sup> Charles-Iyoha C, 2007

<sup>319</sup> LaFraniere S, 2005

<sup>320</sup> Overå R, 2006

business partners within this supply chain. This can be risky as suppliers break contracts, messengers lie or provide false price information, partners either lose or are robbed of money to be delivered on the road and indebted customers disappear. However, trade networks are important for reducing transaction costs, but trust and cooperation among individuals can only be built through repeated and ongoing interaction, communication and sharing of information. The availability, quality and costs of information and the ability to communicate that information are critical foundations for all enterprises, including micro-enterprises<sup>321</sup>. This can be a complicated when the network building extends widely across space, often between rural and urban areas and sometimes even to other countries. Mobile telecommunication provides the tools that can make exchange of information among trade networks more efficient, especially when they are spatially dispersed.

Access to mobile telecommunication has enabled local businesses and entrepreneurs in rural villages to benefit from access to market information, new business opportunities and staying within reach of suppliers, customers and business contacts. Players within a trading network can communicate directly without intermediaries, which makes verifying and controlling information easier and reduces information asymmetry. This enhances the development of trust between actors in the market and facilitate transactions that might otherwise either take place at a higher cost or not at all<sup>322</sup>.

Ninety five percent of the rural female market traders who were surveyed in the Obairuku market, Nigeria, reported that telecommunication had a significant impact on their businesses<sup>323</sup>. Traders spend less time away from their businesses to make trips to suppliers due to the fact that they can use their mobile phones to make the arrangements that previously would have required face-to-face meetings. Even a business with no office or storefront can advertise its mobile contact details using a simple roadside board.

Research conducted by Overå<sup>324</sup> in Ghana has shown that informal traders with access to mobile phones provide better services and create a higher profit potential than others without this access. In Ghana, as in most other African countries, a large amount of imported, expensive petrol is consumed traveling long distances on pot-holed roads to meet business partners, often to only exchange the simplest sorts of information. As the majority of

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<sup>321</sup> Jagun A et al, 2007

<sup>322</sup> Overå R, 2006

<sup>323</sup> Charles-Iyoha C, 2007

<sup>324</sup> Overå R, 2006

Ghanaian traders are illiterate or semiliterate, verbal communication remains the most important mode of information exchange.

The impact of access to telecommunication on the traders in Ghana varies according to factors such as the types of commodities, the scale of trade, the size of the traders' networks and the geographic extent and complexity of the commodity chain. The longer the distance and the more intermediaries and transactions a commodity chain involves, the more time and money can be saved by substituting travel with calls. It is not the cost of transportation of goods that is reduced, but the cost of transporting people to obtain or deliver information and to coordinate activities. Besides saving money on traveling costs, the time that would have been spent traveling can be put into more productive work. Lower transportation costs should increase availability, while leading to higher wages for both producers and traders<sup>325</sup>.

According to Overå's studies of markets in Ghana, traders did not reduce their prices because of savings on travel costs, since the prices of goods are determined by the majority of traders, who do not all have mobile phones. Mobile phone owners' savings therefore resulted primarily into higher earnings and an improved competitive position in relation to those traders without mobile phones. The early adopters thus have a major advantage, which has enabled many of them to expand their businesses and improve their living standards. This advantage will however only last in the early phases of adoption. The growth rate of mobile phone usage in Africa provides an indication of the rapid rate of adoption. It can safely be assumed that the increase in adoption include traders who will increasingly see it as an essential business tool in order to be competitive in the marketplace.

Mobile telephony enables traders to better match rural supply and urban demand and to coordinate a larger number of activities, trading partners and employees. Especially among traders of perishable agricultural goods, it can lead to a more reliable stream of goods to the markets while also reducing the vast spoilage of food that occurs during oversupply situations. For traders of perishable agricultural goods information is critical as the supply and demand can be highly unpredictable and prices change quickly. Without this information a trader risks great losses through either negotiating too small a profit margin, or being stuck with unsold, rotting food.

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<sup>325</sup> Overå R, 2006, citing Mintnet B & Kyle S, 1999

Overå<sup>326</sup> illustrates the information exchange process between urban and rural markets by describing the example of Kofi, a traveling buyer of yams for Ama, a female wholesaler at Agbobloshie wholesale market in Accra. Kofi travels 560 kilometers to Salaga to buy yams from small farmers in the surrounding rural areas. He always calls Ama to inform her of the yam supplies and producer prices. She then assess the supply and demand situation in Accra and decides the quantity of yams Kofi should buy and what price he should offer. If demand is low at the time, she might inform him to wait a week or two. This exchange of information is crucial to the success of their trading, but can be costly and cumbersome. Kofi often has to travel on average 48 kilometers by bus from a village where he negotiated with farmers before he reaches the nearest town with a communications centre. He places a call to the communications centre in Accra where a messenger informs Ama of his call. She then has to go to the communication centre to call him back. To remove this link in the information chain, Ama has bought herself a mobile phone. She can now receive calls from Kofi and other trading partners, who inform her about the yam market in other parts of the country, without having to leave her stall to make calls at the communication centre. By receiving information faster and more frequently, Ama is able to calculate demand, supply and prices more accurately, reducing her risk significantly. It is worth noting that the mobile phone did not give her access to new information, but it allowed her to benefit more from her existing trading network. At the time of the research there was not enough network coverage available in the yam producing areas to make it profitable for her to supply Kofi and others working for her with mobile phones. The cost-saving potential is enormous if all partners in the network have mobile phones. This can be illustrated by looking at the onion trade in Ghana, which has a geographically extensive and organizationally complex commodity chain.

According to Overå, most onion wholesale traders in Accra are male migrants originating from Northern Ghana, Burkina Fasa, Mali or Niger. They make a relatively good income and roughly 25 percent of them own mobile phones. Overå describes the example of Mohammed who comes from Bawku near the border of Burkina Fasa, where he has an onion farm. Following the seasonality of onions, he alternates between living in Bawku and Accra. He and three other men trade in onions and rent unbuilt land in Accra to plant onions on. While the onions are harvested in Accra, Mohammed plants onion seedlings in Bawku. In between planting and harvesting time, Mohammed operates as a trader, selling the onions produced by them as well as those sent to him by his uncle from Bawku, Mali, Niger and Burkina Faso.

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<sup>326</sup> Overå R, 2006

Their business of multi-locality onion production and trading requires extensive coordination and communication in order to balance supply and demand. Their business will be very difficult to manage without the help of mobile telecommunication, because people who perform the various tasks are geographically far apart and moving around most of the time. Mobile telecommunication has made coordination much easier, allowing them to improve their profit potential and save on transportation costs. It has also become easier to monitor whether their workers and trading partners are performing tasks according to agreements. Sometimes agreements are not fulfilled because of the risks involved with long-distance travel, like breakdowns, robberies or harassment by custom officials. By being able to communicate and being informed about delays, customers can be informed and arrangements can be made to assist those on the road. More frequent and efficient verbal communication via their mobile phones has enhanced the trust and confidence between Mohammed, his uncle and trading partners.

Onion traders have also reported that their customer base has increased after acquiring mobile phones. Some customers do not travel to the markets anymore, but place orders via SMS. The trader sends the onions by bus and SMS a message to the customer to inform him of the arrival time of the bus. One onion trader, Abubakar, gives his mobile phone number to customers as a guarantee of his trustworthiness. He encourages them to call, make enquiries or complain if the onions at the bottom of the bag are rotten, in which case he will give them their money back. The strategy also works the other way around: knowing his customers' phone numbers make it easier for him to remind them of their debts. To some extent the network effect of mobile connectivity reduces the risk of transactions for both the trader and customer. By being more available to customers the development of mutual trust can be accelerated, which can lead to more transactions at a lower cost.

Telecommunication can not totally eliminate the need for personal travel or remove all transaction costs. There is still the perception that certain types of information have to be discussed personally, like elaborate contract negotiations or credit requests. Money is also still in most cases delivered in person. In the early phases of building a trading network, repeated face-to-face communication is also crucial, as trade partners have to interact over some time and agree on common norms before trust can be established<sup>327</sup>. According to Overå, talking on a phone is not in itself a trust-building mechanism: rather it is a tool to

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<sup>327</sup> Overå R, 2006 citing Fukuyama, 1995

make already existing trust-building mechanisms, like the exchange of information, observation of behaviour, sanctions against dishonest action and contract fulfillment, more efficient.

- **Micro-entrepreneurial Activity: Manufacturing**

The manufacturing or production-oriented sector is crucial to wealth creation and poverty alleviation, since they form up to forty percent of all micro-enterprises in developing countries and form a core source of value addition<sup>328</sup>. Anecdotal evidence shows that access to mobile telephony has also enabled entrepreneurs within this sector to increase their assets in terms of financial and social capital.

Grace Wachira runs a small business knitting cardigan sweaters in the Kenyan village of Muruguru. Before the base station was built to give the village access to mobile connectivity, she had to walk several hours to the nearest town or ride in a communal taxi to buy yarn or meet customers. She never knew whether the person she wanted to see would be there. Now she uses her mobile phone to arrange for delivery of yarn and to communicate with buyers. Susan Wairimu from the same village reported that business at her tailor shop has also grown since customers give her number to other customers<sup>329</sup>.

There are many stories like those of Grace Wachira and Susan Wairimu that illustrate the savings that these producers can enjoy in terms of unproductive time spent traveling as well as the costs associated with traveling, due to easy access to communication provided by mobile phones. Their stories also relate the growth of their network, which can lead to an increase in business opportunities. There is, however, a lack of research to verify the anecdotal evidence regarding the impact of mobile telephony on the typical supply chain of micro-entrepreneurs in the production sector. Existing field studies tended to focus more on social rather than business uses of mobile phones in Africa. Jagun et al<sup>330</sup> recognized this knowledge gap and attempted to address it by conducting in-depth research on the supply chain of a micro-enterprise sector in Nigeria.

Jagun et al researched the impact of mobile telephony on micro-enterprises focused on production by studying the *aso oke* (meaning “top cloth”) industry. This hand-woven cloth is primarily associated with the Yorùbá people of southwestern Nigeria and is produced mostly

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<sup>328</sup> Jagun A et al, 2007

<sup>329</sup> Ewing J, 2007

<sup>330</sup> Jagun A et al, 2007

for sewing clothes for ceremonial occasions, but also for shoes, bags and soft home furnishings. *Aso oke* production has remained a key economic activity in the rural and peri-urban areas of this district, since it has proved to be resistant to economies of scale and imports that have damaged other small-scale producers of textiles. This is mostly because of the high quality and customized designs required from customers purchasing *aso oke*. This industry has a well-developed supply chain, from thread suppliers through weavers and sub-weavers to final buyers. The sector has seen some level of mobile phone penetration in the two years preceding Jagun et al's fieldwork, but no interviewees had fixed-line telephones and access to functioning fixed-line public payphones was negligible.

The main stakeholders in this industry are the buyers, producers (weavers) and intermediaries. Producers often work in groups with a hierarchy of a master-weaver and sub-weavers. The cloth is produced according to specific design instructions from the buyer. The buyer-driven transaction begins when the buyer or, as in most cases, an intermediary places an order with a weaver. The intermediaries provide access for buyers to producers and vice versa. Buyers usually approach intermediaries because they do not know enough of the product or how it is traded in order to make sound judgments on finding and differentiating weavers and their products, feasibility of designs, price or terms of transactions. The intermediaries will negotiate the trade agreements and are usually responsible for paying for the raw materials. They also monitor the contract fulfillment process, making sure that the quality of the cloth complies with the original agreement.

The stakeholders are often geographically dispersed and because of the bespoke nature of the cloth to be woven, traveling between the stakeholders of the supply chain is unavoidable. As a result, order fulfillment can take a long time and any design changes or problems along the way can be a cumbersome process, requiring many days for interaction. Ultimately the buyer has to pay for the costs of journeys and intermediation, but the weaver is often the one who has to lower his price.

Intrinsic risks are present for weavers and buyers. Weavers are sometimes underpaid and do not necessarily have the means to enforce contractual agreements. On the other hand, buyers are sometimes overcharged or the quality not according to expectation. Because of these intrinsic risks, trust and reputation are important qualifiers in this industry. It requires constant interaction along the supply chain, with intermediaries often becoming the proxies for trust and reputation, since they can monitor the behavior of both the weaver and buyer. However, this has a reinforcing effect within the supply chain in that it reduces the

opportunities for the flattening of information asymmetries and creation of trust between producers and buyers.

Of the stakeholders interviewed for Jagun et al's<sup>331</sup> research, all buyers and intermediaries owned their own mobile phones, whereas only about one-quarter of the weavers owned a mobile phone. In some cases intermediaries operated their own vertically integrated supply chain and worked with a particular group of weavers. They supplied a mobile phone for the master-weaver of the group to use. The intermediary, either retained ownership of the mobile phone with the master weaver responsible for purchasing airtime, or the handset was sold to him and the cost recouped by the intermediary through monthly deductions. Weavers also used the services of the so-called "umbrella people" who are selling the use of their mobile phones. They will either take messages for the weaver or summon him on a caller's request to receive a call. Some weavers also gained access to a mobile phone through family and friends, who will take messages for incoming calls.

It was found that access to mobile telephony has reduced the time and financial costs of information gathering and had a qualitative impact on the completeness of information. Stakeholders could judge whether a journey is required before embarking on it. The informational impact of mobile telephony also enabled faster, cheaper and better decision-making because more sources of information could be interrogated – about orders, about threads and about the capacity to weave.

Based on the evidence and interviews conducted by Jagun et al<sup>332</sup>, mobile phones did not eliminate, but ameliorated the three process challenges in micro-enterprise supply chains: speed, costs and risks. Mobiles were seen to reduce the delays, reduce the financial costs, and reduce the risks of being involved in this production sector. Journeys and in-person meetings, however, remain an ongoing requirement of operating in the manufacturing sector where physical materials have to be exchanged for trade. This is especially true for the *aso oke* industry, where textiles are woven to individual specification. It requires supply chain decisions that are unstructured – complex and non-routine, with degrees of subjectivity and uncertainty. The types of questions that might need to be resolved often revolve around design decisions or issues of trust, which are not always readily amenable to phone-based information gathering.

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<sup>331</sup> Jagun A et al, 2007

<sup>332</sup> Jagun A et al, 2007

Some studies have shown that buyers can reduce their costs because mobile telephony enables them to communicate and purchase directly from producers. However, buyers of *aso oke* perceived that any mobile-enabled reduction in purchase price through disintermediation is more than offset by an increase in transaction costs, an increase in uncertainty, and an increase in risk. The information asymmetries on which intermediation in this sector is based were also maintained – unequal access to knowledge about design, supply mechanisms, costs, trading processes, mechanisms of redress and unequal access to capital.

Mobile telephony did not necessarily level the playing fields, as those who cannot afford mobile phones are losing orders to the better-resourced weavers. Weavers who can afford mobile phones have gained in terms of the number and size of orders, faster turnaround and a better quality of the final product leading to more customer satisfaction. Mobile telephony was not seen to lead to building new relationships, but rather to strengthen existing relationships and thereby strengthening their social capital of trust and reputation.

Jagun et al<sup>333</sup> conclude that their study of the effects of mobile telephony on the *aso oke* industry has shown that it had an economizing effect on supply chain processes, but no significant restructuring effect on the organization of supply chains. They point out that the penetration of mobile telephony into this supply chain was still at its early stages. As Africa, like other developing countries, has seen much innovation in business uses of mobile telephony, it can be expected that future studies may show new patterns emerging in supply chain processes and structures.

Even though the industry they studied might not be representative of production or manufacturing micro-enterprises in general, it does, according to Jagun et al, epitomize the type of production that lies at the intersection of the cultural and the functional; production where local taste, culture and custom still matter and, hence, where design matters. These relatively protected, design-intensive type of industries will most likely be able to survive the drive for developing countries to liberalize their import regimes. These sectors are therefore likely to become more important in providing opportunities for income diversification for rural African communities as sources of employment and income.

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<sup>333</sup> Jagun A et al, 2007

## 6.5 Improving livelihood outcomes

Barrett and Swallow<sup>334</sup> define poverty as a multi-dimensional phenomenon encompassing low income or consumption, high vulnerability to shocks, and lack of voice and power. Their theory on fractal poverty traps sees all three factors (income poverty, vulnerability and voicelessness) linked through asset holding (financial, social, human, physical and natural) and mechanisms of production and exchange. From evidence presented in this thesis, it can be argued that mobile telephony can contribute to the mitigation of all these factors, thereby alleviating the chronic poverty trap.

It has been shown in this thesis that users from African rural communities have adopted and appropriated mobile telephony to the point where it is assimilated and embedded as an essential tool in the process of production within chosen livelihood strategies. By providing mobile phone users access not only to information, communication and knowledge, but also access to markets and entrepreneurial opportunities, mobile telephony is facilitating asset accumulation and productivity growth among the chronically poor in rural Africa. The resultant increase in financial and social capital, shown to be a potential outcome of access to mobile telephony, reduces communities' vulnerability to shocks. The 'voiceless' people are given a 'voice' since mobile telephony breaks the trap of isolation, as well as the literacy barrier prevalent in rural Africa. As a development tool, mobile telephony presents an immense opportunity to African rural communities for inclusion in the information society, breaking a further downward spiraling into chronic poverty.

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<sup>334</sup> Barrett CB and Swallow BM, 2003, p2

# Chapter 7

## Concluding Findings

### 7.1 Objectives of the Research Achieved

The objective of this research was to investigate the value contribution of mobile telephony and its emerging mobile business models to the sustainability of African rural communities' livelihoods. This was achieved through:

- Investigating the growth of mobile telecommunication in Africa and rural Africa specifically.
- Analyzing African rural communities' vulnerabilities and livelihoods strategies according to the Sustainable Livelihoods Framework.
- Research on mobile business models and developing a definition of mobile business models applicable to an African rural context using the Livelihoods Framework and a Value Constellation perspective.
- Investigating the multiple players who are active in creating a mobile business ecosystem and therefore mobile *value constellations* in rural Africa, using the *Mobile Business Application Framework*.
- Establishing the level to which end users have adopted and appropriated mobile telephony.
- Researching how the value creation made possible by mobile telephony can lead to an increase in livelihood assets within the prevalent livelihood strategies in rural African communities.

### 7.2 Mobile Telecommunication for African Rural Communities.

With the staggering growth rate of the mobile telecommunication industry in Africa, it was found that there are active, innovative efforts by the industry to extend their offering to rural Africa. These efforts are partly driven by goals set by the international community to *connect the unconnected* as part of poverty relief programs, but also by the business opportunities at

the *bottom of the pyramid*. As more and more people are connected to the mobile telecommunications network, the socio-economic benefits are potentially significant for African countries, which have continuously struggled with the wicked problem of chronic as well as transitory poverty. The economic impact of mobile telephony and the value created to its end-users are said to be the greatest where there is no existing fixed-line communication network, as is the case with rural Africa. This premise of mobile telephony creating considerable socio-economic value for its end-users is the motivation for the proposition of this research, namely that mobile telephony and its emerging business models can contribute to sustainable rural livelihoods.

For mobile telephony to successfully be the means to the ends of improved livelihood opportunities for the rural poor of Africa, relevant offerings have to be devised that are suitable to the end users' context. It is therefore important to define mobile business models according to an African rural context. The conditions for success was identified to be firstly, that all the players responsible for creating the mobile ecosystem have to *adapt* their value offering to the context. Secondly, the intended end users have to not only adopt mobile telephony as a communication tool, but also *appropriate* it to the point of devising their own value creating uses of the technology. The third condition for success is that users have assimilated mobile telephony as an enabling tool within their value creating activities in pursuit of increasing livelihood assets (financial capital specifically and social capital broadly).

In order to establish the relevancy and suitability of mobile value offerings, the starting point for this research was a contextualized analysis of African rural communities. Using the Sustainable Livelihoods Framework to guide this analysis, the vulnerabilities experienced by these communities and their chosen strategies to pursuit assets accumulation were identified.

The identified vulnerabilities experienced by the potential end users inform not only the challenges, but also the risks for service providers to this market. Their value offerings have to be adapted accordingly in order to ensure adoption. With 51 percent of Sub-Saharan Africa's rural communities still living under US\$1 a day, pervasive poverty continues to be the most pivotal vulnerability to consider in this context. Structural Adjustment Programmes by the World Bank in the 1980s curtailed government spending, leading to a lack of infrastructure development like fixed-line telecommunication, roads and electricity, exacerbating the isolation of rural communities. Their isolation and general lack of facilitating structures left these rural communities without the basic resources for economic

and social interaction: information, knowledge and the ability to communicate across great distances. The lack of infrastructure provides enormous practical and logistical challenges to the mobile telecommunications industry, while simultaneously being the very reason for the immense interest and uptake of their offering.

African rural communities had to adapt their livelihood strategies according to the events, largely beyond their control, that make up their vulnerability context. The rural population is mostly made up of smallholder peasant farmers. However, the commercialization of agricultural production, as well as the opening up of markets to imports is forcing these peasants to diversify their livelihood strategies in order to supplement income generated from agriculture. Apart from *agricultural income streams*, the following diversification activities to generate *non-agricultural income streams* were identified: waged labour, migration of household members and micro-entrepreneurial activities.

Unlocking the value of mobile telephony beyond its function as a communication tool requires the innovation of value-added service offerings, leveraging the capabilities inherent in the mobile network to differentiate it from off-line services. Complete end-to-end mobile service solutions require the collaboration of a complex network of actors within a *value constellation* to co-produce value for the customer. Through their systematic social innovation efforts, complex business systems are often redesigned to make them valuable, useful and affordable for rural African customers. The value of their offering is determined by the value-creating potential provided for their customers in their homes and their livelihood strategies. Using a Livelihoods Framework and Value Constellation perspective, these service offerings, referred to as *mobile business models*, are defined for the African rural context as:

*Value-creating activities enabled by the appropriation of mobile telecommunication solutions within chosen livelihood strategies, with the objective of increasing livelihood assets for positive livelihood outcomes.*

This definition encompasses three components that are implicit to the conditions of mobile telephony's successful contribution to sustainable livelihoods. *Firstly*, enabling mobile telecommunication solutions are in the domain of the value constellation of actors active in the mobile industry in Africa. They have to *adapt* their offering in order to develop an application infrastructure that is relevant to the African rural communities' vulnerabilities and livelihood strategies. *Secondly*, users can only realize the value-creating potential of mobile

telephony and make it useful within their livelihood strategies if they go beyond merely adopting it as a communication tool. They need to appropriate the technology to make it their own. *Thirdly*, by assimilating mobile telephony and its value offerings into their livelihood strategies, value-creating activities are made possible. This should contribute to an increase in livelihood assets, which in turn should result in positive livelihood outcomes. These three factors were researched for validation through the study of existing literature and reported case studies.

### **7.3 The Value Constellation of Actors: Providing relevant mobile telecommunication solutions.**

The value constellation of actors active in the mobile industry in rural Africa was analyzed using the Mobile Business Application Framework. While placing the end-user with mobility-related needs at its centre, this framework classifies the market players into three groups: technology providers; network providers; and services and content providers. The widespread poverty, resulting in affordability being an issue, and a lack of infrastructure were identified as the main constraints that these groups have to contend with. They have to ensure that their value offerings are useful and applicable to the rural African context.

- **Addressing the issue of affordability:**

Affordability represents a big barrier to entry for the rural poor. This is however partly addressed through various low-cost handset initiatives for the emerging market, which has reduced the cost of ownership significantly. The cost of network connectivity has also been made more affordable by selling pre-paid airtime in small denominations. Mobile network operators have also introduced free cross-border roaming services in some areas where there is a high level of migration between countries. One technology provider, the Nokia Siemens Networks, addressed affordability through their network technology innovation that enables calls within a local radius at a very low cost.

- **Creating solutions to overcome a lack of infrastructure:**

Mobile operators are seen to be implementing creative solutions to power their remote base stations cost effectively, as a response to the lack of reliable electricity provision to rural areas. Their power solutions range from using wind, solar or wind/diesel hybrid generators to using sustainable biofuels cultivated and processed by local farmers, instead of using expensive diesel to run their generators. In some instances excess power is produced and

sold on to the local communities. The lack of electricity also impacts the end-users in that recharging their mobile phones can be problematic, but projects like Motorola's Motopower initiative, which provide solar recharge facilities at kiosks all over Uganda, is designed to overcome this constraint.

- **Devising relevant mobile value added services:**

There are many examples of mobile value added services that are specifically geared towards the African rural context. The most successful and empowering initiatives for content provision to this market are seen to be those that focus on agricultural livelihoods, by providing better access to markets and localized information on prices, products and weather conditions. Even though there is a lack of empirical data to substantiate claims, anecdotal evidence and reports from project implementers have shown that their mobile content solutions had a significant impact on farmers' and fishermen's income.

Providing mobile financial services has also proven to be a very successful, appropriate value offering with enormous transformational consequences for the unbanked, low-income users in rural Africa. Mobile service providers have taken advantage of the gap left by banking institutions that, due to their costly infrastructure and service fees, do not view the low population densities as attractive business opportunities for them to engage with. Using their existing infrastructure, mobile operators have managed to keep their mobile banking (m-banking) service offering simple, easy to use and affordable. The service enables users to deposit money; make transfers between accounts; and make cash-free payments for goods. Some of the advantages of m-banking to rural users are that the risk associated with their reliance on cash is reduced and that they can conduct financial transactions across long distances at affordable rates.

It was found that there is active engagement across all three groups, making up the value constellation of actors, in innovating appropriate mobile solutions and to overcome complex constraints. They are often seen to collaborate on research, implementing pilot projects and participating in international dialogue in order to exploit the potential of mobile telephony as a poverty alleviation tool. Major international players in the mobile industry are displaying a remarkable level of willingness to adapt their offerings and to develop new solutions and business models specifically for the rural markets of the developing world. Proof of the success of mobile solution providers' value offering in rural Africa can be deduced from the

fact that the rapidly increasing uptake of their services is reported to have exceeded all expectations.

#### **7.4 From adopting to appropriating mobile telephony.**

Mobile telephony can only contribute to sustainable livelihoods if users can exploit its value-creating potential and make it useful within their livelihood strategies. They would therefore have to go beyond merely adopting it as a communication tool and appropriate the technology to make it their own; assimilating it not only within their social practices, but more importantly, into their economic practices. Based on the premise that mobile business services are by definition a social innovation where users have choices, user adoption and appropriation were analyzed through the lens of social theories of technology use.

Users are found to be creatively destroying mobile telephony to the point where mobile operators are forced to learn and adapt to the innovative ways in which Africans, especially the poor, use their mobiles. They are shaping the technology into products and services suitable to their capabilities and needs in a manner that is diametrically opposed to technological determinism. They have made sense of mobile technology's features and created distinct social and economic practices around the technology, suited to their livelihood strategies and vulnerabilities. Examples of innovative, creative destruction and appropriation of the technology are the practices of sharing mobile phones, intentional missed calls (*beeping*) and using airtime as virtual currency. Even though the origins of this creative destruction could not be ascribed specifically to African rural communities, they are extensive users of the identified examples.

#### **7.5 Mobile Business Models: Assimilating mobile telephony into livelihood strategies.**

This research was focused on mobile telephony's contribution to value creation within the identified rural livelihoods strategies' income generating activities in the agricultural sector as well as activities that are not agriculture related. It was found that users have indeed assimilated mobile telephony into these activities as an essential value-creating tool. As mobile telephony enables rural communities' access to information, markets and opportunities to participate in entrepreneurial activities, their vulnerabilities are decreasing and their income generating potential is increasing.

All identified income-generating activities benefited from being able to communicate over long distances in that they no longer need to embark on long, arduous, expensive and often unnecessary journeys for face-to-face communication at the same frequency as before. Mobiles therefore have a quantitative impact by reducing transport and transaction costs, while increasing productivity and therefore income. Besides these general benefits, there were also specific benefits identified within the various income generating streams.

- **Agricultural Income**

It was found that rural African farmers benefit enormously from mobile solutions that provide them with timely access to relevant and accurate information that support effective decision-making. Information that is dynamic and time dependent, like price information, the demands and locations of buyers and weather forecasts, is especially of great value to these farmers. Various case studies have shown local markets being transformed by the mobile telephony enabled dissemination of information on prices and the supply and demand situation: reduced wastage and price volatility, reduced prices for consumers and improved profits for producers. Supply chains of fresh produce have become more responsive due to the effortless, instantaneous flow of communication and information between suppliers and buyers. It can be surmised that mobile telephony has become an essential tool in assisting farmers to conduct their agricultural income generating activities in a financially viable manner.

- **Non-Agricultural income**

Mobile telephony was found to be a substantial value adding contributor to all the prevailing non-agricultural income generating activities identified in rural Africa, namely migration, wage labour and micro-enterprise activities.

Mobile payment (M-payment) services were shown to provide an alternative to risky informal money transfer systems for people who migrated from rural Africa in search of income opportunities elsewhere. This cost-effective, timely and low risk service enables subscribers to send and receive low-denomination, high frequency money transfers using their mobile phones. It was found that the ability to send and receive money affordably, without long delays, reduces the households who are receiving the remittances' vulnerability to income shocks and provides them with capital to invest in other income generating activities.

Information on waged labour opportunities in rural Africa, which are predominately available on a day-to-day basis due to its informal nature, is mostly spread by word-of-mouth. Access to information on waged labour opportunities has improved due to mobile telephony's contribution to the strengthening of social networks. This has led to a more effective and productive casual labour force in rural areas.

Based on the literature researched, it was found that mobile phones ameliorated the three process challenges in micro-enterprise supply chains: they are slow, costly and risky. Mobile phones were seen to contribute to reducing delays, financial costs, and the risk of being involved in micro-entrepreneurial activities due to the reduction in information asymmetries and uncertainties. Mobile telephony enables traders to better match rural supply and urban demand and to coordinate a larger number of activities, trading partners and employees.

The growth of the mobile industry into rural Africa has opened up many opportunities for rural communities, women in particular, to participate in entrepreneurial activities providing mobile services to their local communities. This has resulted in socio-economic empowerment, transformation and sustainable livelihoods for these entrepreneurs.

## **7.6 Conclusion**

Nobel laureate Amartya Sen said that the deficiency of information and lack of social connectedness are the two main reasons for human deprivation. Increasing the flow of information, communication and knowledge is a critical component of sustainable development and poverty reduction, as it forms the lifeblood of economic and social interaction. With rapidly growing levels of penetration, mobile phones provide the primary technology for access to information, communication and knowledge in rural Africa. Mobile telephony is therefore playing an increasingly important role in supporting livelihood strategies and its associated income streams, contributing to a vibrant rural economy at a local level.

Mobile telecommunication has become a valuable development tool for reducing the vulnerability of rural African communities. However, the key to success lies in devising relevant uses for mobile telephony suitable to the local context. The mobile telecommunication industry is seen to be appropriately responsive by continuously adapting and innovating solutions that are taking cognizance of the local context. Their value offerings are successfully geared towards overcoming the lack of infrastructure, affordability and users' requirements.

African mobile phone users have successfully adopted and appropriated mobile telephony and its value offerings to create value for themselves in their livelihood strategies, often independent of external interventions. The value that mobile telephony enables users to create within their income generating activities is impacting users' social and financial capital positively.

This research concludes that mobile telephony and emerging mobile business models are contributing to increasing African rural dwellers' income generating potential, reducing their vulnerability to shocks, and providing them with a voice; thereby contributing to sustainable rural livelihoods. The potential that this technology holds for development is immense. Once the infrastructure is universally in place, it will provide an unprecedented opportunity for appropriate innovation. It will continue to provide a vast, but exciting challenge for research scholars for many years to come!

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