

**The Mobile Telecommunication Production Network in Africa:
From indecent work to development and performance enhancement**

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1. Introduction

Living as we do in the second decade of the twenty first century, good telecommunication has become an essential requirement to sustain high performance and quality of life. In Africa mobile telecommunications has expanded exponentially over the last decade and will continue to do so during this decade. Mobile phones have become the quintessential means of communication, not just for social purposes, but also for work.

But behind the small mobile phone lies a complex global production network that is mostly out of sight. This paper aims to bring some of it into view. The first aspect to be looked at is the mining of coltan, a rare mineral found in the Democratic Republic of the Congo (DRC) that is used in the manufacture of mobile phones. It will show that the conditions under which the mineral is mined qualifies as grossly indecent work and that it is extremely hard to impose any regulation on the conditions.

At the other end of the production network, the consumer-user end, there is a different dynamic at work. In developing countries the mobile phone has become an instrument for development, entrepreneurship, job creation, improved economic

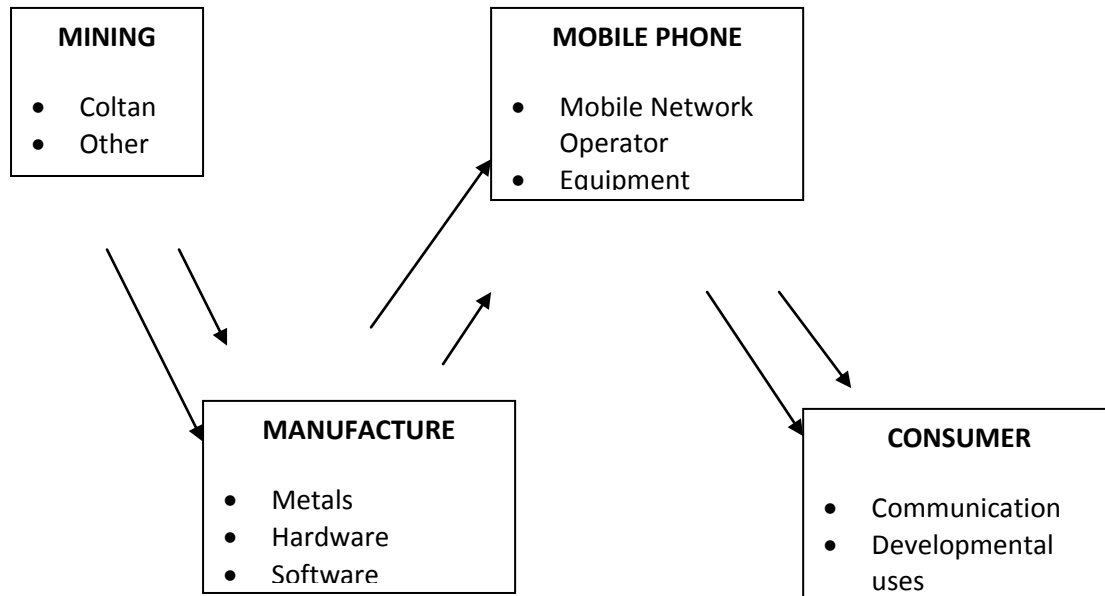
performance and quality of life enhancement. This has been well documented in India and Bangladesh, but also in many Africa countries. This paper aims to share some of these developmental, entrepreneurial, and life-enhancing uses to which the mobile phone is being put in Africa.

Finally, in this age of globalization in which we now live, the question arises how to evaluate investments that are being made in the mobile telecommunications industry. How does a developing country decide whether the investments are beneficial or detrimental? The paper develops a set of criteria for doing so and applies it to the issues discussed. It finds that there is much to be concerned about in the mining stage of the production network, but also much to be hopeful about at the end-user stage.

2. The Global Mobile Telecommunications Production Network in Africa

The mobile telecommunications production network is very complex and interwoven. It can broadly be presented as in figure 1.

Figure 1. The global mobile telecommunication network in Africa



Source: Lee and Gereffi, 2010:2.

The mining of metals that go into the production of mobile phones takes place all over the world, including Africa.

The manufacture of mobile phones has become increasingly concentrated in China. This is because the cost of production in China is so low that other countries find hard to compete with China.

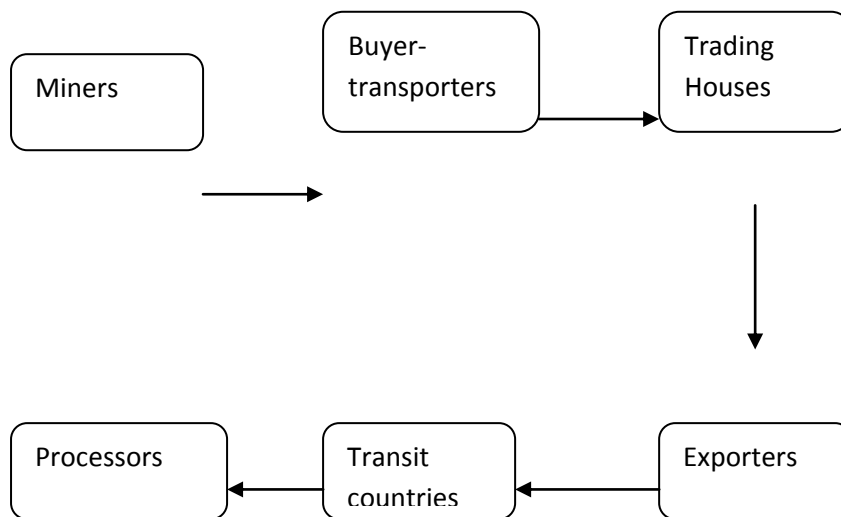
The mobile network operators (MNOs) that provide mobile phones and services to consumers and subscribers exist all over the world. There is tough competition between them and they keep on the lookout for methods to cut costs and enhance their services in order to attract more customers.

Whereas in high income countries mobile phones tend to be used by consumers for leisure purposes, in low income developing countries mobile phones have been put to innovative developmental uses. These will be examined in the paper after

scrutinising the extraction of the mineral columbite-tantalite, commonly referred to as coltan, in the DRC.

3. The mining and marketing of coltan

Figure 2. The Coltan Value Chain



Source: Nathan and Sarkar, 2010:2

In Africa coltan is mined in the eastern part of the Democratic Republic of Congo (DRC).

Coltan is used in capacitors as it allows for the storage and virtually instantaneous release of electric charge with minimal power loss. Globally, it is mined in the following proportions: Africa 30%, Australia 30%, Brazil 15% and China 8%. (Nathan and Sarkar, 2010:2)

Coltan is often near the surface and is thus relatively easily mined. In the DRC 12 of the 13 major mines are controlled by various armed groups, including the Congolese army and two Rwandan militias. Small-scale surface mining is also controlled by armed groups, collectively called the *mai mai*. Child labour is frequently used and women are sexually abused by the soldiers and the *mai mai*. The armed units 'tax' the mines and extort money or minerals at check-points they control.

The coltan is sold to merchants who transport it to trading houses in two towns in the DRC, Goma and Bukavu. There are about 100 trading houses in each of the two towns. The trading houses sell to the exporters. There are 17 in Bukavu and 24 in Goma. Coltan is also smuggled across the Congolese border into Uganda, Rwanda and Burundi.

The United Nations conflict mineral policy requires that the source of all materials have to be revealed and that minerals may not be obtained from conflict areas. It is possible to identify the geographic source of coltan ore since it differs in colour and texture from region to region. However, when coltan ore is brought to the buyer-transporters and trading houses in separate sacks or other containers all that is done is to ask whether the coltan came, for instance, from genocide organizers. Once the ore has been refined and turned into dust or wire, there is no way of tracing the source of supply. (Nathan and Sarkar, 2010:4 and 5)

The exporters process the minerals using machinery and then sell the minerals to foreign buyers. (Nathan and Sarkar, 2010:3) However, world-wide just three processors account for 80% of the ore. They are the US Cabot Lodge, German H C Stark, and Chinese Ningxia. After the UN Security Resolution in conflict minerals from the DRC, Cabot and Stark decided not to use coltan from the DRC. However, a 2002 UN report found that up to 50% of Ningxia's coltan came from Central Africa. China is now the primary consumer of the DRC's coltan. (Nathan and Sarkar, 2010:4)

4. Mobile Network Operators (MNOs) in Africa

Table 1. Mobile network operators worldwide 2009/10

Rank	Company	Home Country	Subscribers (millions)
1	China Mobile	China	527.4
2	Vodafone	United Kingdom	428.0

3	Telefonica/Movistar	Spain	200.9
4	America Movil	Mexico	194.3
5	Orange	France	189.0
6	Telenor	Norway	174.0
7	Bharti Airtel	India	169.5
8	T-Mobile	Germany	150.9
9	TeliaSonera	Finland, Sweden	143.9
10	China Unicom	China	142.8
11	MTN Group	South Africa	116.0
12	Orascom Telecom	Egypt	115.7

Source: Lee and Gereffi, 2010:21, Table 5. (Compiled from Wikipedia List of mobile network operators, accessed 20 Apr 2010.)

MNOs play a key role in providing customers with the services required to operate and use their mobile phones. They have taken on gigantic proportions with millions of customers who subscribe to make use of their services. Table 1 below indicates the twelve largest MNOs in the world from 2009 to 2010. Two of the MNOs are African-based: MTN, the 11th largest, is South African, and Orascom Telecom, the 12th largest, is Egyptian. MTN operates in Africa and the Middle East, while Orascom Telecom has a similar profile except that it also operates in Canada. (Orascom Telecom, 2010)

Table 2 indicates the twelve largest MNOs operating in Africa in terms of subscribers. South Africa's MTN is the largest and, along with other brand names in which it holds a significant share, operates in 16 countries. Vodafone, a UK-based MNO, is the second largest. It owes most of its subscribers to Vodacom that is registered in South Africa and Safaricom that operates in Kenya. It is interesting to note that two of the top twelve MNOs are from the Middle East (Kuwait and United Arab Emirates) while a further five are from three north African countries, Morocco, Egypt and Algeria.

Table 2 Mobile Network Operators in Africa 2009/10

Rank	Mobile Network Operator	Home Country	Subscribers (millions)	Number of Countries
1	MTN	South Africa	82.8	16
2	Vodafone	UK	81.0	8
3	Zain	Kuwait	48.3	16
4	Orange	France	33.9	15
5	Globacom	Nigeria	20.1	1
6	Maroc Telecom	Morocco	19.0	4
7	Orascom Telecom	Egypt	18.7	5
8	Djezzy	Algeria	14.7	1
9	Etisalat	UAEmirates	12.5	6
10	Tigo	Tanzania	11.8	6
11	Mobilis	Algeria	9.5	1
12	Meditel	Morocco	9.4	1

Source: Wikipedia, 2010.

Notes: MNOs include other brand names in which they have a large share.

Vodacare includes Vodacom in which it has a 65% share.

Table 3 African Countries' Mobile Phone Subscribers and Penetration Ratios 2009/10

Rank	Country	Subscribers (millions)	No of network operators	Penetration Ratio (%)
1	Nigeria	66.0	9	44.5
2	Egypt	58.7	3	70.9
3	South Africa	49.9	5	102.2
4	Algeria	32.5	3	94.5
5	Morocco	25.3	3	81.2

6	Kenya	17.7	4	47.2
7	Tanzania	16.8	11	39.8
8	Ghana	14.9	5	63.7
9	Ivory Coast	11.7	6	63.9
10	Sudan	11.7	4	30.0
11	Tunisia	9.6	3	95.6
12	DemRepCongo	8.6	6	13.6

Source: Wikipedia, 2010.

Table 3 indicates the twelve countries in Africa that have the largest number of mobile phone subscribers. Nigeria, with the largest population in Africa - approximately 148 million - is top of the list with 66 million subscribers. South Africa lies third with almost 50 million subscribers. It is one of the few countries in Africa that has a penetration ratio of more than 100%, that is, there is more than one mobile phone subscriber for every citizen. This comes about because some people make use of more than one mobile phone – one for private use and one for work, for instance. In general, the penetration ratio of mobile phones in Africa is relatively low. In mid-2009 it was estimated to be about 42%.

Table 4. MTN in Africa 2009/10

Country	Number of Operators	Total number of subscribers	Pene-tration ratio	MTN Sub-scribers	% of all Sub-scribers
Benin	4	2.8 mill	21%	1.6 mill	56%
Botswana	3	2.1 mill	105%	1.2 mill	43%
Cameroon	2	5.3 mill	30%	4.4 mill	82%
Congo Rep	4	2.1 mill	52%	1.3 mill	62%
Ghana	5	14.9 mill	64%	8.0 mill	54%
Guinea	5	2.0 mill	21%	1.3 mill	64%
Guinea-	3	0.5 mill.	28%	0.4 mill	78%

Bissau					
Ivory Coast	6	7.4 mill	40%	4.4 mill	60%
Liberia	4	1.5 mill	44%	0.7 mill	48%
Nigeria	9	65.8 mill	45%	30.8 mill	47%
Rwanda	3	2.5 mill	23%	1.9 mill	76%
South Africa	5	45.0 mill	92%	16.1 mill	36%
Sudan	4	11.7 mill	30%	3.8 mill	32%
Swaziland	1	0.6 mill	33%	0.6 mill	100%
Uganda	6	8.2 mill	25%	5.2 mill	64%
Zambia	3	4.0 mill	32%	1.2 mill	29%

Source: Wikipedia, 2010 and other googled sites.

Notes: In Benin, Ghana and Guinea the MNO is Areeba, 75% owned by MTN.

In Liberia the MNO is Lonestar, in which MTN has a 60% share.

In Botswana the MNO is MASCOM, in which MTN has a 53% share.

In Sudan the MNO is MTN Sudan, in which MTN has a 85% share.

Tables 4 and 5 present the profiles of the two South African MNOs that have a significant presence in other African countries. MTN and Vodacom. Of the two, MTN has a far more extensive outreach is the larger and operates in more countries. It has 66.8 million subscribers in 15 African countries outside South Africa, whereas Vodacom only has 13.3 million in 4 other countries.

Table 5. Vodacom in Africa 2009/10

Country	Oper- ators	Sub- scriber s	Pene- tration	Vodaco m Subscbr s	% of all Subscbr s
D R Congo	6	5.9	9%	3.5	60%
Lesotho	2	0.7	32%	0.6	91%

Mozambique	2	4.8	24%	2.3	48%
South Africa	5	45.0	92%	27.1	60%
Tanzania	11	13.9	33%	6.9	50%

Source: Wikipedia, 2010.

With this background information regarding the MNOs operating in Africa and extent of mobile phone subscription and penetration on the continent, the article now turns to focus on the developmental uses to which mobile phones have been put in Africa.

5. Developmental role of mobile phones in Africa

Mobile phones have been put to a wide range of developmental applications in Africa. Six of the areas of endeavour where this has happened are the following.

1. Telephone ladies and village phones;
2. Health services;
3. Agricultural extension services;
4. Marketing of produce and fishing catch;
5. Increased efficiency: raises GDP per capita;
6. Transfer of money to rural areas

The first telephone ladies were started by Iqbal Quadir, a Bangladeshi, who moved to America and became an investment banker. Through his efforts GrameenPhone was established, a joint venture between Grameen Bank and Telenor, a Norwegian telecommunication company. They extended loans to women in rural villages to enable them to buy a mobile phone, an antenna and a large battery so they could sell calls to other villagers. They were able to pay off the loans and use subsequent earnings for further developmental purposes, such as starting another venture or paying for children's education and health care. The village-phone system has since been replicated in three African countries, Cameroon, Rwanda and Uganda.

(*Economist*, 2009:5) One of the first women in Uganda to become a village phone operator, Ms Mary Wokhale, bought a basic handset and a roof-mounted antenna with the aid of a micro-finance loan. She then sold phone calls to other villagers as a business, making a small profit on each call. Her cumulative takings enabled her to open up other businesses such as selling beer and a music and video shop. She could then see to the upliftment of her family by helping members of her family pay their children's school fees. (*Economist*, 2009:3)

The village phone services subsequently extended to other developmental uses. In Uganda an agricultural information service called Farmer's Friend is available to mobile phone users. It provides a wide range of agricultural services from weather forecasts to farming advice how to protect crops such as rice from aphids and tomatoes from blight. Health services helping rural people find the nearest clinic (Clinic Finder) and how to deal with common diseases (Health Tips) have also become available to mobile phone users. (*Economist*, 2009:12)

An example of the use of mobile phones in health services comes from Tanzania. A clinical officer from the Ilembula Lutheran Hospital frequently visits people at their homes. In remote areas he takes notes and pictures of patients with his mobile phone and shares this information with specialists from Dar es Salaam and abroad. Specialists view the information and provide advice so the officer which enables him to treat the patients himself. (Personal communication by email from Dev Nathan, 6 Dec 2010)

Leonard Waverman from the London Business School found in 2005 that an extra 10 phones per 100 people raised the GDP per person by 0.6% of growth in a typical developing country. An economist from the World Bank did a related study in 120 developed and developing countries and came up with a similar finding: a growth of 10 per cent in mobile adoption in a developing country increased GDP per person by 0.8 per cent. (*Economist*, 2009:6)

Mobile phones have also been used to transfer money to people without bank accounts. M-Pesa in Kenya have been the pioneers in this. They developed a system that enabled remittances by migrant workers in towns and cities to send

remittances to their poor families in rural areas. The first users of M-Pesa were young male workers who used it to send money home to their rural families. The system has now been extended to pay for everything from school fees to taxis. Roughly US\$2million is transferred through the system daily, with an average amount of US\$20. (*Economist*, 2009:14) It now runs the most widely adopted mobile money scheme in the world. It was launched by Safaricom, Kenya's largest mobile operator in 2007 and had nearly 7 million users by Sept 2009. Safaricom is 40% owned by Vodafone and 60% by Public Float. In 2009 it had 14.5 mill subscribers.

MTN launched a mobile money scheme in Uganda in March 2009 in partnership with Stanbic Bank. After 4 months it had signed up 82,000 users. (*Economist*, 2009:15)

In October 2009 First National Bank (FNB) South Africa launched its "Send Money" scheme whereby an FNB client can send money to anybody with a mobile phone in South Africa. By July 2010 it had 150,000 clients who had sent almost R100 million to mobile phone users. Money has frequently been sent to rural areas and towns close to Zimbabwe. (van Wyk, 2010)

6. Criteria for assessing impact of investment in Africa

While the coltan mining and developmental uses of mobile phones discussed above are not hard to evaluate, there are many other instances where it is not so easy to make a sound judgement. This is partly because it is not always apparent what criteria to apply and how to apply them. In order to assist in evaluating whether an investment in a developing country is beneficial or detrimental, it is useful to draw up an explicit set of criteria for making the evaluation. Such a set of criteria is briefly spelled out below.

The criteria have been drawn up to apply in five domains of a country's economy and society. They are:

1. Economy,
2. Labour and Employment,
3. Social life,
4. State and Politics, and
5. International Linkages.

The criteria have been categorized into those that are beneficial to the recipient developing country and those that are harmful.

Beneficial effects on recipient developing country:

1. Economy: higher productivity; technology and skills transfers; cheaper and better products and services.
2. Labour and employment: creation of decent work; more jobs.
3. Social life: empowering women and poor people.
4. State and politics: create enterprises independent of the state and ruling party that operate on sound economic and financial principles and adhere to rules and regulations..
5. International linkages: gain access to information and communication technology (ICT).

Harmful effect on recipient developing country:

1. Economy: create greater inequality; more poverty.
2. Labour and employment: deskilling of labour; creation of insecure jobs.
3. Social life: destroying social cohesion and communities.
4. State and politics: establishing corrupt relationships and practices; over- or under-regulate the investment.
5. International linkages: increased dependency; unfair trade.

These criteria can be applied in examining the mobile telecommunications production network in in all stages of production from extracting minerals to end uses of the phones.

Conclusion

It is clear that the global mobile telecommunication industry has played a harmful role in Africa in the extraction of coltan. The work is not decent or humane and women and children are grossly abused. In the process they destroy the foundation of a caring community that nurtures its children and creates harmony, peace and wellbeing.

Mobile network operators on the other hand have played beneficial roles in many African countries. They improve agricultural production and health, they help to increase the prices rural producers receive for their crops, they empower women, they facilitate the flow of rural remittances, and they help to raise the general standard of living.

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