Tele-centres as a way of achieving universal access—the case of Ghana

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Abstract

Creation of a countrywide network of tele-based information centres (or 'tele-centres') offers a low cost opportunity to empower local communities in developed and developing countries to meet the challenges of the information society. This paper presents a field study of how tele-centres in Ghana have contributed to universal access and discusses their potential impact on rural development.
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1. Introduction

The huge gap between developed and developing countries in telephone penetration has existed for decades. While most industrialised countries have more or less achieved universal service, many developing countries suffer from a severe under-supply of telephone lines. In particular in Sub-Saharan Africa telecommunication facilities are inadequate. If South Africa is excluded, in 1996 there were only 5 phone lines per 1000 inhabitants (World Bank, 1998) and in many countries, most rural areas are still without any provision of telecom facilities at all. There are more telephones in Manhattan than in Sub-Saharan Africa—even when South Africa is included—and half of the population has never made a phone call.

A part of the explanation is that low levels of income imply that the demand for telephones is too low to make extension of the grid beyond the major cities viable. But many countries have long waiting lists indicating substantial suppressed demand.

These facts are well known and the negative impact of this on development opportunities has been documented in numerous publications (e.g. Saunders, Warford, & Wellenius, 1994). With

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the new digital economy it becomes even more important for developing countries to develop their communication infrastructure. The information revolution poses both new challenges and new opportunities for developing countries. "Whether the benefits of the information revolution will outweigh the costs remains to be seen. However, one thing is certain; developing countries cannot afford to wait and see what happens" (ITU, 1995).

Adequate telecommunication facilities have become ever more important for attracting investments and for achieving integration in the world economy. Countries without an adequate telecom infrastructure and without local expertise in ICT will find it very difficult to remain competitive in the world market. There are, however, guarded reasons for optimism.

First, telecommunication services and equipment are becoming cheaper. It thus becomes feasible to provide telecommunication services at affordable prices in rural Africa.

Secondly, World Wide Web and e-mail provide new opportunities for low cost communication and dissemination of information, and thereby promote economic and cultural development (ITU, 1995). Tele-medicine can extend the outreach of public health services, tele-learning and on-line extension services can support farmers and increase agricultural production, and producers can gain better access to market information and marketing.

If all parts of society are to enjoy the benefits of ICT services, it is necessary to provide universal access. Universal access does not necessarily imply a telephone line for every household. Universal access can be defined as a telephone available within 20 km (as achieved in Burkina Faso), within a travelling distance of 30 min (as proposed in South Africa) or, as has been achieved in Ghana, a telephone in every locality of more than 500 people (ITU, 1998). One way to achieve this goal is to establish a network of community centres where ICT facilities are made available to the public.

2. Tele-centres and universal access

Tele-based information community centres or simply tele-centres can play an important role in a strategy for providing universal access to ICT services both in developed and developing countries, and the concept has in recent years been promoted by a number of national and international development agencies.

A number of different models for the development of tele-centres have been applied in different parts of the world. The first such centres established in Scandinavia focused on the provision of IT facilities and dissemination of technological knowledge. The aim was both to reverse a trend of outward migration from rural areas, and to increase IT awareness and capabilities. Public funds were provided for the initial investment and for operations during the first years.

In other countries centres are focused on the creation of new job-opportunities. Some centres act on a purely commercial basis, and are operated as any other private company. Although they may contribute to regional development, this is not their primary objective.

In the UK, which has a high concentration of tele-centres, most function as telework centres and provide facilities for teleworkers. Eighty per cent of the centres provide facilities for teleworkers coming from more than one company. Also in France, teleworking plays an important role in the creation of tele-centres, the most successful centres acting as IT service companies with little or no emphasis on local development objectives. Many of the North

American tele-centres have established teleworking as their primary activity. California, in particular, has established a substantial number of teleworking centres. However, there are also a number of community-based technology centres employed in training marginalized people.

A very different concept of tele-centres has been used to promote rural development in Eastern Europe, most notably in Hungary, and later also in Estonia, where an active telecottage movement has been set up with support from Sweden. More than 50 centres are operating in each of these two countries. Hungarian tele-centres are established to prevent outward migration from rural areas through the provision of telecom access, job training and career counselling for the local population. Many of the services provided are not directly related to ICTs. Education and training in computer skills are provided in most centres, but training in other subjects is also provided. Consulting has included agricultural extension services and support for marketing and export of local food products.

A similar concept is used in Australia. As one of the few high-income countries with a very sparse population, Australia provides unique experience of the operation of tele-centres in remote areas. Australian tele-centres offer many different types of services. Most important are activities which contribute to the development of the local community. Some of the services provided have very little relation to IT or to telecommunications. The tele-centres have provided substantial impetus to cultural and economic life in remote areas. For instance 50% of the tele-centres produce a local newspaper for their town.

In many Third World countries, most of the tele-centres are essentially phone shops, sometimes also offering public access to fax or other supplementary services. In the Indian state of Punjab more than 10,000 such centres have been established on a franchise basis. In Senegal 12,000 such centres have been established as private franchises initiated by the PTO. At the end of 1996, 6% of the telephone lines were used by tele-centres and one-third of these were located outside the capital (ITU, 1998).

Indonesia has also been successful in setting up tele-centres. Such centres (Warung Telekomunikakasi or Wartels) were established on a franchise basis from 1988. At the end of 1994 there were 1500 centres generating about 9000$ per line (ITU, 1998). Similar centres were planned in Thailand.

WorldTel offers an interesting model for the establishment of tele-centres. WorldTel is a private limited London-based company established on the initiative of the ITU. It invests equity capital to facilitate the development of start up and early stage operating companies to develop operations that provide a response to the large unmet demand that exists in emerging markets (WorldTel, 2002) WorldTel is more ambitious with regard to the range of services it seeks to provide than most of the existing third-world tele-centres, and has developed a commercially viable model for rapid Internet penetration into emerging markets through the establishment of community Internet centres. WorldTel planned to establish Community Internet Centres in Indian towns and in other regions as well (Ravi, 1998).

Even more ambitious centres offering a multitude of services like IT training, distance learning, tele-medicine, informational services, etc. have also been established. This type of centre has typically been established in co-operation with international agencies like the ITU, FAO and UNCTAD in an increasing number of low-income countries (e.g. Benin, Mali, Tanzania and Surinam) or as part of national programs financed by telecom operators (South Africa and Tunisia).

Ghana has followed a seemingly different model, as Ghanaian tele-centres have been established on the initiative of private entrepreneurs. Although their primary service is related to telecommunication they may also offer other business services like photocopying or text editing. So far this type of centre is mainly located in urban neighbourhoods, where there is a large population of customers without residential access to basic telecom services, but wireless local loop technology can now be used to establish tele-centres also in rural areas.

It follows that the concept of tele-centres embraces a wide spectrum of strategies for using information and communication technologies in the development of local communities. Some centres are essentially providers of access to ICT services at various levels, while others focus on the use of ICT technologies as a tool for the provision of other services to the local community. This variation complicates the search for a strict definition of the concept of tele-centres that embraces all of the above-mentioned initiatives.

The British Telecentre Association (TCA) makes a distinction between "telecottages" and "tele-centres" (Simmins, 2002). While telecottages are community based and emphasis is on social objectives such as learning, access to technology, access to work, etc., tele-centres are more commercially focused and emphasis is placed on the provision of a working environment for tele-workers. This definition corresponds to the concept of shared facility centres developed in California (Gillespie, Richardson, & Cornford, 1995), but it does not fit very well with the situation in Third World countries, where tele-work plays a very limited role. Here the term tele-centre is often used for small shops providing telephony services to the general public.

Another distinction can be made according to management structure. Gómez, Hunt, and Lamoureux (1999) distinguish between basic tele-centres implemented by non-Government organisations or other non-profit groups, tele-centre franchises, which are centrally co-ordinated, e.g. by the incumbent telecom operator, civic tele-centres set up in public libraries, schools, universities' etc., cybercafes set up in tourist areas and wealthy neighbourhoods, and finally multipurpose community tele-centres (MCTs) being introduced in a number of countries with support from the ITU and offering a wide range of community services.

The concept of MCTs (or Community Tele-Service Centres (CTSCs), or Multipurpose Community Information Centres (MPCICs) corresponds to the concept of tele-cottages (CTSC International, 2000; Cogburn et al., 1999). These are multipurpose centres that support a number of different activities for the local community within a rural area or a deprived urban area, so that communal use can be made of the facilities available.

This paper adopts the concept of tele-based information centres or simply tele-centres, as centres that supply one or more tele-based services to the local community, and thereby contribute to cultural or economic development. Such centres may receive different types of funding or generate their own income by selling their services on purely commercial terms. This broad definition includes telecottages as well as community tele-service centres and multipurpose community information centres.

3. Overview of universal access to ICT services in Africa

The penetration of phone lines in Africa is 16.6% of the world average, with a penetration of 2.52 mainlines per 100 inhabitants. The gap in penetration of more advanced ICT technologies is

Table 1
Penetration ratio of ICT services in Africa compared to world average, 2000 (per 100 inhabitants)

	Africa	World	Africa as % of world average
Phone lines	2.52	15.23	16.55
Mobile phones	1.16	10.37	11.19
Pc's	0.94	7.71	12.19
Internet users	0.42	5.46	7.77
Internet hosts.	0.03	1.75	1.57

Source: Calculated from ITU Telecom indicators http://www.itu.int/ti/industryoverview/index.htm

even more pronounced than it is for basic phone services. The penetration of PCs and mobile phones is only 11–12% of the world average and the penetration of Internet services is even lower (Table 1).

These figures also indicate another characteristic of the infrastructure of African countries: Their communication infrastructure is focused on external rather than internal communication. The majority of the phone lines are located in the capital and it is usually easier to place a phone call to Europe than it is to call a neighbouring town or even another district in the same city. It has been claimed that ICT services are constructed in the same way as the railway lines were at the beginning of the 20th century. These lines were constructed mainly to facilitate exports of primary goods and not to improve the internal transport infrastructure. Therefore the lines primarily connected areas with intensive extractive industries, such as mining, with the major seaports.

This outward looking structure is seemingly repeated in the penetration of Internet services. The number of users is 7.77% of the world average, while the number of hosts—an indicator of the amount of local information made available on the World Wide Web—is as low as 1.57%. It appears that the Web is used by a small minority of the population concentrated in the capital cities for access to outside information, and not for dispersion of information produced locally to the community.

Despite the vast potential, the impact of ICT technologies has so far been centred around a few modern segments of the society mainly in the capital and perhaps a few of the larger towns. In these segments ICT technologies have first of all enabled integration with the global communication infrastructure and international economy. The majority of the society will, however, be largely unaffected by this development unless wider access to ICT services is obtained. This may create a new digital divide, not along international frontiers, but between different parts of the society.

Liberalisation and privatisation of the telecommunications sector has in several countries contributed to a more dynamic development. The number of lines has grown substantially during the past few years. In particular the number of wireless connections (either cellular or wireless local loop), as in other parts of the world, has been subject to impressive growth rates. This development has taken place not only in metropolitan areas, but also some rural areas have benefited from the growing number of lines.

Some countries have, through the establishment of a universal service fund or other types of obligations imposed on telecom operators, promoted the installation of phone lines in rural areas. However, this strategy is not always enough to ensure long-term universal service. Experiences

from South Africa indicate that it can be hard to motivate operators to deliver a reasonable quality of service, if servicing of rural areas with information and communication services remains unprofitable (Benjamin, 2000).

4. Universal access to ICT services in Ghana

The penetration of telephone lines in Ghana between 1980 and 1994 was stabilised at a level around 0.3 per 100 inhabitants, but following liberalisation and subsequent privatisation, substantial growth rates in the number of lines have been achieved. In addition to this, mobile phone services have been in operation since 1993, and today three operators have in total around 70,000 subscribers (1999 figures). Even if mobile phones are included, teledensity did not exceed 1 per 100 inhabitants before 1999 (Table 2).

There is a substantial unsatisfied demand for telecom services. Ghana Telecom has a waiting list of around 50,000 and in addition to this, there is also a suppressed demand from people who have given up applying for a phone either because of the long waiting list or because they live outside the reach of the national grid.

Telephone lines are highly concentrated around the capital Accra. Only in Greater Accra and in the Ashanti Region with the second largest town of Kumasi and the gold mining city of Oboasi, does the penetration exceed 3 lines per 1000 inhabitants. But even in the Greater Accra region, penetration remains below 5% (Table 3).

In the rural areas where 70% of the population lives, the number of phone lines is extremely limited. All regions outside the capital have a penetration rate below 0.5%. Even in these regions phone lines are concentrated around the regional capitals. In 1998 only 48 out of 110 district capitals were connected to the national grid (Bertolini et al., 1999).

Cellular phones are an alternative to those who are unable to obtain an ordinary line, either because of the long waiting list or because they live in an area not yet wired by Ghana Telecom.

Table 2
Number of lines and teledensity in Ghana

Year	No. DELS	DELS per 100 inh.	No. of cellular subscribers	Cellular subscribers per 100 inh.	Total penetration of wired and cellular lines
1980	36,931	0.33	—	—	0.33
1985	37,600	0.30	—	—	0.30
1990	45,500	0.37	—	—	0.37
1993	48,681	0.30	1742	0.01	0.31
1994	50,007	0.30	3347	0.02	0.32
1995	63,067	0.37	6137	0.04	0.41
1996	77,886	0.44	13,804	0.07	0.51
1997	105,534	0.57	28,853	0.16	0.73
1998	133,000	0.72	39,750	0.21	0.93
1999	158,000	0.81	70,000	0.36	1.17

Sources: PORSPI, Ghana: Ghana Telecom—Statistical data & W.H. Atubra & G.K. Frempong: The Assessment of the Telecommunications sector in Ghana, 1999 figures are from http://www.itu.int/ti/industryoverview/index.htm

Table 3
Penetration of lines by region

Region	% of all national lines	Estimated lines per 100 inh.	% of lines located in the regional capital
Greater Accra	78.8	4.89	94
Ashanti	8.6	0.39	93
Western	3.5	0.25	86
Central	2.5	0.19	64
Eastern	2.5	0.13	44
Brong Ahafo	1.2	0.08	55
Volta	1.1	0.08	50
Northern	0.5	0.03	78
Upper West	0.4	0.08	100
Upper East	0.3	0.03	79
Total	100	0.72	90

Sources: Bertolini et al. (1999), PORSPI (1992) and own calculations.

However this option is much more expensive and is not available in all areas. Until recently only the Accra area, the three major regional capitals and Oboasi were covered by cellular networks. Since then cellular services have become available also in Tamale—the capital of the Northern Region and further extensions have been made in the Southern part of Ghana—in particular along the main roads. However, although cellular phones may improve universal access to these places, they add to the skewed distribution of telecom facilities between cities and rural areas.

There has been a tremendous growth in public payphones. In 1993 there were only 29 pay phones—all located in Accra. Pay phones are now being introduced in both urban and rural areas and by early 2001, 4000 payphones were in operation (Apewokin, 2001). The concentration of pay phones in Accra is less pronounced than the concentration of other services as less than half of the payphones are installed in the capital. Pay phones have been installed in most of the district capitals and even in smaller towns. However, 80% of the public payphones are located in the capital and the nine regional capitals.

Following liberalisation there are now three providers of fixed services and three providers of mobile services. Out of these only two are active in rural areas, namely the incumbent operator Ghana Telecom and Capital Telecom. Capital Telecom is a private Ghanaian company and is only licensed to provide telephony service in rural areas. The company commissioned its services in 1997 in Southern Ghana using wireless local loop technology. So far three hubs each with a capacity of 1000 lines are in operation (Table 4). Seven hubs were planned to be operational by the end of year 2000.

Capital Telecom suffers from a particularly wide distribution of customers density due to the nature of the areas in which it operates. In such predominantly rural areas the density of inhabitants and customer income is lower than in the cities. In addition the rates charged by Capital Telecom are 2–3 times higher than those of Ghana Telecom, making it impossible to compete in areas where both operators are present. The towns where the present hubs of Capital Telecom are located are all served by Ghana Telecom, and only people living in the most remote

Table 4
Subscribers and network capacity of Capital Telecom

Hub site	1997	1998	1999 (April)	Total no. of subscribers	Capacity
Akatsi	122	68	12	202	1,000
Akim Oda	23	71	7	101	1,000
Mpraeso	—	18	45	63	1,000
Total	145	157	64	366	3,000

Source: Capital Telecom/Atubra and Frempong (1999). The Assessment of the Telecommunications sector in Ghana.

areas beyond the reach of the Ghana Telecom grid are effectively potential customers for Ghana Telecom.

According to Capital Telecom the major reason for the high tariffs charged is the Interconnect agreement with Ghana Telecom. This agreement implies that Ghana Telecom gets 75% of the revenue earned by calls that originate or terminate in the Ghana Telecom network.

The Internet was introduced in Ghana in 1995 by Network Computer Systems—a private Ghanaian company. In 1996 two more operators—Africa On-line and Internet Ghana entered the scene. Today Africa On-Line is the premier Internet provider (see Box 1). The number of customers in May 1999 amounted to 10,600 with a dial up connection and 3000 connected through a corporate network.

5. Development of tele-centres in Ghana

Tele-centres in Ghana have—at least in some areas—compensated for the low penetration of telephones. Although a few centres have been established through international grants, the overwhelming majority of the centres are purely commercial in orientation and have been established by private entrepreneurs as small private enterprises. This development has not been initiated through national or international development programs, the initiative coming from the entrepreneurs themselves. Some of the tele-centres were established even before it became legal for private businesses to resell telecommunication services to the public. Already as far back as 1992 a number of tele-centres were established and a 1997 study reports 50–60 such centres in the Greater Accra region (Mansell, 1997). The market continues to grow.

In order to assess the role of tele-centres in the provision of telecom access and in rural development a survey of such tele-centres was undertaken. The survey was conducted as a field study covering tele-centres in three selected regions of Accra (Accra Central, Madina and Nima) and two district capitals (Akatsi and Sogakope). The survey was carried out in May 1999 in co-operation with Kofi Ohene-Konadu from the University of Ghana, in order to obtain more information on the economic viability and the community impact of Ghanaian tele-centres. Supplementary information has been collected in field studies in Kumasi—the old Ashanti capital and the largest city adjacent to Accra, and in the Mpraeso district in the Eastern Region.

The field study recorded more than 20 tele-centres in each of the two neighbourhoods of Nima and Madina. Nima is a typical low-income residential area with some small businesses as well.

Box 1

Africa On-Line

Africa On Line is the premier provider of internet communications services throughout Africa. The company was founded in 1994 by three Kenyans studying in the United States. Africa On-line is headquartered in Nairobi, Kenya with operations in Kenya, Cote d'Ivoire, Ghana, Namibia, Swaziland, Tanzania, Uganda and Zimbabwe. It launched its operations in Ghana in 1996.

Africa On-line has four hubs in Ghana: Accra, Takoradi, Kumasi and Tamale. They are connected via VSAT. There is no interconnection to other Ghanaian isps.

Africa On-line offers three levels of Internet access: basic, classic and executive. Basic provides access to e-mail only and costs 20$ a month. Classic and executive include also WWW.

A new service is fax sent via the Internet. By use of this service it is possible to send faxes abroad without having provided IDD.

Africa On-line provides Internet services to private and corporate customers as well as to tele-centres. There are more than 4000 customers in Ghana. These are concentrated in the capital and Kumasi and Takoradi. In 1999 there were only 5 customers in Ho (the provincial Capital of the Volta Region and 20 in Tamale (The provincial capital of the Northern region).

Africa On-line was the only ISP serving tele-centres in 1999, but other Internet providers have tried to enter this market.

Africa On-line provides tele-centres with e-mail services and/or web-browsing. Customers pay

2000 cedi per mail, 45% of this goes to Africa-Online. Web browsing costs 300 cedi per minute. 100 cedi goes to Africa-Online. E-mail is by far the most popular service. The tele-centres pay Africa On-line on a weekly basis.

Africa On-line has had 400 tele-centres connected, but only 120 have remained active. These centres earn revenue of at least 50,000 cedi per week. These centres have a client base of more than 50 customers each.

Africa On-line has around 25,000 mail boxes in Ghana. 18,000 of these are located in Accra.

Source: Interview with Africa On line. May 1999, Accra.

Madina is a high-income suburb of Accra situated close to the University campus. The number of tele-centres in the business district of Accra central seems to be more limited. This may be due to a higher penetration of private phone lines in this area.

Outside Accra tele-centres are mainly located in the regional and district capitals. In the Kumasi area more than 40 tele-centres were identified, and it is estimated that the region in total has approximately 200 tele-centres. An obvious reason for the concentration of tele-centres in the capitals is that most of the villages are not connected to the national grid. In this case Ghana Telecom will only provide a telephone line if the subscriber is prepared to pay for the installation costs including a radio link to the nearest hub. However, in those regions covered by Capital Telecom villagers can have a line on conditions similar to those offered in the towns. The two district capitals covered by the study are neighbouring towns in the Volta Region, both connected to Accra by the Accra–Lomé highway. Ghana Telecom operates only in Akatsi, while Capital Telecom offers its services in both towns. Six tele-centres were recorded in Akatsi and four in Sogakope. In Mpraeso district there were 25–30 tele-centres while less than five of these are located in the two major towns (Mpraeso and Nkawkaw).

In Accra the standard equipment for a tele-centre is two telephone lines, two phones, a fax, a photocopier and one or two computers. The tele-centres outside the capital are, however, generally less advanced than the tele-centres in Accra. These centres usually have only one or two phone lines and no computers. The tele-centres in Kumasi resemble those in Accra in terms of equipment. 17 tele-centres out of 40 were equipped with a fax machine and 10 with at least one computer.

Table 5
Range of services offered by tele-centres

	No. of TC inter-viewed	Av. No. of lines	Outgoing calls	Incoming calls	Photo-copying	Word-processing	E-mail
Accra	4	2	4	5	5	4	1
Madina	16	2.9	16	15	8	8	4
Nima	6	1.8	6	6	4	4	3
Akatsi	6	1.2	6	5	1	0	0
Sogakope	4	1.8	4	4	1	2	0
Kumasi	26	2.2	26	25	11	4	3

Note: The numbers indicate the number of tele-centres interviewed offering the service.

All centres provide outgoing calls and this is also the main source of revenue. Most centres also provide incoming calls. Customers can visit the tele-centre and receive calls there. Some centres will even offer to send a messenger and contact the customer if a call for him/her is received. This service is not always charged, but seen as an additional benefit offered to attract customers (Table 5).

In Accra local and international phone services are the most important. In Akatsi and Sogakope trunk calls in particular to Accra assume highest priority.

Many of the tele-centres are either established in conjunction with other businesses or try to expand their revenue by offering complementary services, such as typing and photocopying. One tele-centre also offers collection of daily revenue for businesses too small to have their own banking account (the so-called su-su service).

E-mail services are offered from a small number of centres in Accra. An e-mail address can be obtained free from Africa On-line and e-mails can be sent for about 0.25 cedi per message. This service is also available from post offices (Sangonet Database, 2001). E-mail is becoming very popular in particular among university students. Outside Accra it is both difficult and expensive to obtain access to Internet-based services. Usually it is necessary to pay for a trunk call while connected.

As mentioned above, Ghanaian tele-centres are usually created by small entrepreneurs on their own initiative. This is reflected in the sources of funding. The major source of such funding emanates from their own financial resources or loans from a close relative, but tele-centres are also established as a part of other small businesses financed by business income generated locally. Only one tele-centre has received funding through the formal financial system, and this was only mentioned as one of a number of financial sources. An interesting aspect is that earnings sourced from abroad, e.g. during a scholarship period, seem to be a very common type of funding (Tables 6 and 7).

Most of the centres interviewed were very new and not very profitable. The daily revenue varied from 2 USD to 60 USD dollars, most centres reported a revenue of approximately 25 USD per day. Many of the centres in Accra which have been in operation for some years complained about increasing competition. Many have considered a tele-centre to be an easy way to establish a new business and conveyed the impression that in Accra there were too many centres to make business really profitable.

Table 6
Funding of tele-centres

	Owner	Bank/moneylender	Friends/relatives	Other/not known
Accra	5	0	1	1
Madina	11	0	3	4
Nima	5	0	1	1
Akatsi	3	1	1	2
Sogakope	4	1	1	0
Kumasi	20	1	4	1

Table 7
Average income and investments

	Average income (cedi and $)	Average investment (mill. cedi and 1000$)
Accra	53,000/21.2	13.7/5.5
Madina	40,417/16.2	12.7/5.1
Nima	78,750/31.5	24/9.6
Akatsi	31,400/12.6	2.9/1.2
Sogakope	71,250/28.5	(85/34)
Kumasi	45,000/18.0[a]	—
Total average	50,911/20.4[b]	20.7/8.3

Note: Not all centres were able to estimate their total investment. In Sogakope only one relatively large centre with many other activities reported on its investments.

[a] The median is used as a proxy for the average.
[b] Excluding Kumasi.

The centres also felt competition from the increasing number of phone booths, which offer lower rates. It is, however, necessary to invest in a phone card before a phone booth can be used. This is a major expense and an important barrier to usage of phone booths by the rural poor. People using phone booths also have to place the call themselves and customers using a phone booth are generally better educated than the customers who use a tele-centre.

One tele-centre in Madina was established by use of radio wave technology. The centre was established in 1992 long before Ghana Telecom extended its service to the area. The owner of the centre did not regard the tele-centre business as being profitable, but has considered setting up a new business in a rural area not then served by any of the telecom operators.

Busy hours in the Accra-based centres are early mornings and evenings, indicating that the services are used mainly for contacting family members and friends. However, particularly in Nima, a number of small enterprises rely on services from the tele-centres. An indication of this is that some centres combine their tele-services with other business-related services.

In Akatsi market days are the busiest. Villagers use the market day to place phone calls. A survey of users in the Akatsi region concluded that locals use telecommunication services mainly to enhance their businesses. The main benefit was information on market prices enabling farmers to decide when to travel to a specific market to sell or buy products (Bertolini et al., 1999).

Table 8
Employment and gender

	Av. No. of people employed	Gender of owner (male/female)	Gender of manager (male/female)
Accra	2.8	4/2	4/2
Madina	2.2	12/4	10/6
Nima	2.7	6/0	5/1
Akatsi	1.5	6/0	5/1
Sogakope	2.5	4/0	4/0
Kumasi	2.7	34/7	28/11

Each of the tele-centres provides employment for 2–3 people. The owner is typically the manager or a relative of the manager, particularly in Accra where some of the centres are owned by a person not directly involved in the business. Tele-centres seem largely to be male-orientated businesses in respect of ownership and management, in particular outside Accra and Kumasi. However, many of the centres are operated by a female often educated as a secretary (Table 8).

5.1. Tele-centres in Mpraeso district

The two major towns in the district of Mpraeso and Nkawkaw are both served by Ghana Telecom. There are less than 120 subscriber lines in Mpraeso and even less in Nkawkaw. There is a long waiting list of subscribers indicating a suppressed demand for telecom services in the area.

Capital Telecom had 63 subscribers in the district in 1998. As the services of Capital Telecom are much more expensive than Ghana Telecom, most subscribers are located outside the major cities. (There is only one subscriber in the town of Nkawkaw.) The subscribers are spread among 30 different locations, the most remote being 60 km from Mpraeso.

Private phones are often financed by relatives from Accra, who want to be able to call their families in one of the villages.

Out of the 63 subscribers 24 were communication centres. Therefore Capital Telecom has had a substantial impact on rural access to telephones, although the number of subscribers is limited. This is not the result of the promotion of tele-centres. Capital Telecom management is not very enthusiastic about the aggressive promotion of tele-centres, as they worry about the payment of the bills. The managers of tele-centres are not always able to keep track of their telecom expenses and to charge their customers correctly. This frequently results in a shortfall in their payments to Capital Telecom.

For its part, Capital Telecom demands that business customers pay a deposit of 500,000 cedis. Most of the tele-centres are unable to pay this deposit but Capital Telecom has nevertheless chosen to connect them, even if they are unable to pay; the reason being the very low utilisation of the capacity in their network.

6. Viability of demand-driven tele-centre in Ghana

In Ghana, as well as in many other developing countries, the demand driven centres mainly focus on provision of basic communication services such as telephone, fax and sometimes also

e-mail and Internet. Demand-driven centres can be initiated on a franchise basis as is done by the PTO in Senegal and Indonesia and in the Punjab in India or—as in Ghana—by local entrepreneurs.

The tele-centres in Ghana are clearly profit-oriented and resemble in many ways the tele-centres established on a franchise basis e.g. in Senegal and Indonesia with regard to services provided. On the other hand they are set up by individuals often without any access to financial and technical support and managerial expertise. They have been established on the initiative of local private entrepreneurs without being part of any type of special program. In this respect they resemble cybercafés, but the services they provide are different and more clearly directed more towards business applications than entertainment.

Ghanaian entrepreneurs are not supported by any national or international programmes and the owners must be able to finance the tele-centres from their own pocket. The survey carried out indicates that self-financing is the most common model. Better access to finance may increase the penetration of tele-centres, but none of the centres interviewed mentioned that lack of access to credit was a problem, and in the regions included in the survey the market for tele-centres seemed to be close to the level of saturation. The situation may, however be quite different outside the district capitals. When more villages can be reached through wireless local loop solutions, provision of a credit line designed for tele-centres may become more relevant.

Although the primary services of the demand-led centres are related to basic telecommunications, they may offer other business services like photocopying in addition. So far this type of centre is mainly located in urban neighbourhoods, close to a large population of customers without residential access to basic telecom services.

The tele-centres in Ghana are commercially oriented and established with the primary objective of generating income for their owners. However, they offer an important contribution to the local community by providing telecom access in a country with very low telephone penetration. The number of phone lines is rapidly increasing along with the number of phone booths. It is therefore possible that tele-centres will become less important in the future. At present tele-centres generate most of their income through phone services and the question intrudes whether urban-based tele-centres will remain viable. The survey indicates that the density of tele-centres is lower in the most advanced business districts of Accra than in the neighbourhood surrounding the city centre.

The long run viability of the tele-centres will depend on their ability to upgrade their services into new areas, such as e-mail and other computer services. In regard to this, lack of human resources may be a major barrier. Most of the employees in the tele-centres do not have the expertise to offer more advanced business and community services of the type offered e.g. in Hungary. They also lack a tele-centre association, which can support them in the development of their business. A World Bank Mission has therefore been proposed to establish a Ghana National Service Centre by private investors (Community Communication Centres for Knowledge Exchange, 1999). Such a centre should, among others, support tele-centres in the development of skills in telecommunications technology and management. Another initiative has been taken by a group of tele-centres in Kumasi. They have created their own association in order to protect their interests with respect to the Government and the telecom operators, in particular Ghana Telecom.

An important question for the development of rural-based tele-centres is whether the demand for communication services is sufficient to make a tele-centre economically viable. In rural areas

the affordability of telephone services to local people can be a barrier towards further development. Although there is an obvious need for access to telecommunication facilities in rural areas, it may not be possible to provide the service at prices affordable to the local community.

This question cannot be answered in general as rural income levels can vary in different countries and regions. Experiences from remote areas in high income countries such as Australia, Alaska and Northern Canada indicate that demand in rural areas generally exceeds forecasts based on population density or per capita income (Hudson, 1998). Preliminary studies of the financial viability of tele-centres in rural areas in low-income countries indicate that they could be attractive business cases, even as a ''stand alone'' businesses (Uganda), or in small numbers (12 tele-centres in the Indian case), at least for local entrepreneurs, but this remains to be proven (Ernberg, 1998). The experiences from Surinam indicate that low income can be a barrier towards the establishment of an economically viable tele-centre (Goussal, 1998).

According to an analysis of affordability by the ITU, Ghana is under-serviced with telecommunications lines taking both tariffs and income levels into account (ITU, 1998). However, the situation may be different in some of the rural areas. The Ghanaian district town of Sogakope is not serviced by Ghana Telecom, but by Capital Telecom. Capital Telecom offers wireless local access. Although this may be a cost-effective solution its charges are several times higher both with respect to monthly line rental and call tariffs, and this affects the viability of tele-centres in the region.

The rural-based tele-centres have on average a slightly smaller turnover—in particular on supplementary services—than in the capital, but the costs of operation is also lower.

Telecom access and service is a major expense for all tele-centres. It is therefore important for their viability that a fair arrangement is made with the telecom operator. If rural-based tele-centres using wireless local loop technologies are to succeed, tariffs must be competitive with those in the fixed network. This will demand that a fair arrangement for interconnection of rural operators with the incumbent operator is ensured. In some countries (e.g. Hungary) preferential rates for tele-centres are negotiated. Another more ambitious solution has been considered by WorldTel, namely construction of a common backbone network for their tele-centres. This will make tele-centres operated on a franchise basis by WorldTel less dependent on the tariffs offered by the telecom operators.

7. The community impact of tele-based information centres

Although the point of departure varies from region to region, and although the services provided by tele-centres also vary, the overall objectives are basically the same; namely upgrade of local access to information and communication in order to generate economic and social development in a local area.

This overall objective can be addressed in different ways. Setting up a tele-centre in a local community addresses at least five related and partly overlapping issues:

- the creation of regional development and cohesion (cultural or economic);
- provision of infrastructure: (1) to provide access to IT and telecom facilities; (2) to provide access to IT-related business services;

- promotion of the diffusion of usage and knowledge of IT;
- provision of training, particularly to local people, for the acquisition of IT related skills and qualifications;
- the creation of local employment.

The priority between these issues and the way they are addressed may vary, but most tele-centres will address a number of them.

7.1. Regional development and cohesion

The concept of tele-based community centres was first developed in Scandinavia under the name 'telecottages' and the first centre was opened in Sweden in September 1985. Rural communities suffered from lack of employment opportunities and lack of an infrastructure of local services. Employment in agriculture had in many countries decreased to one-third of the level of a few decades earlier; local shops were closed down and rural communities had developed into satellite communities with decreasing populations and no internal infrastructure.

The objective of the first tele-centres in Scandinavia was to use modern information technology to strengthen the cohesion of local communities in rural areas. Also in Hungary and Western Australia, regional cohesion is addressed very explicitly through provision of community services such as the issuing of a local newspaper.

Creation of regional cohesion is a very broad objective and all subsequent objectives contribute more or less to this overall objective. It reflects the dualism of the objectives of many tele-centres, which both have soft-value objectives such as enlightenment and cultural development on the one hand, and harder economic objectives related to generation of income and employment on the other. Although many centres address both types of objectives, the priority between the two has been very different.

The primary objective of the Ghanaian tele-centres is to generate profit for their owners. However, their contribution to regional development through provision of telecom access is indeed indisputable.

7.2. Provision of access to IT and telecom facilities

This objective is the most basic, as it is in some sense a precondition for usage of IT and telecommunication services to create local development. The first tele-centres established in Scandinavia did not focus on access to telecom facilities, as universal access to basic telecommunication facilities was already in place. On the other hand, provision of local access to computers was one of the primary objectives.

In Ghana tele-centres help to compensate for the low penetration of phone lines through public access to telecommunication facilities. This is often the most important service, both with respect to the number of people served and to the income generated. The telecom service is used both for private and business communication, and is of major benefit for many local businesses.

However there is still a long way to go. The majority of the rural areas and even some urban neighbourhoods are not connected to the national grid. Here tele-centres can only be established

by use of wireless technologies such as GSM or wireless local loop. So far GSM is only an option in the major cities and it is far more expensive than a wired line. Wireless local loop is available in the three districts in the southern part of Ghana, where Capital Telecom operates.

Although Capital Telecom has only made a minor contribution to the penetration of telecom services in terms of the total number of lines, it has made a major contribution to public access to telecom facilities in the three districts, where it has set up its operations. Its customers are dispersed over a wide area and about 25% of their lines access tele-centres. Therefore several thousand people can benefit from the service provided by its 630 lines.

E-mail still plays a very limited role in this respect, but the service has great potential. E-mail addresses are offered free of charge and the use of e-mail is growing rapidly. However, Internet connection from rural areas is still very expensive and growth is centred around the capital.

Another barrier against the provision of more advanced services is the poor quality of fixed lines complicating data-transmission. Furthermore the limited wireless line capacity is not suitable for web browsing, but can only be used for simple e-mails and other low-capacity data-applications.

7.3. Promotion of diffusion of usage and knowledge of IT and training

Usage and knowledge of IT is promoted both through the mere fact of access to facilities and by training. Training is an important ingredient in the activities of many tele-centres. Particularly in their initial phase, many tele-centre programs have focused much of their attention on training activities.

In addition training can, if implemented successfully, be a major source of income for some tele-centres. Training activities also contribute to the establishment of the centre as a central meeting place in the community while strengthening other information activities.

Training and informational activities are usually supported by public funds and it is unlikely that commercially based tele-centres, such as those in Ghana, will engage in this without any support from donors or the district council. In addition, very few of the centres have the skills necessary for providing training or other information activities.

7.4. Provision of access to IT-related business services

Provision of access to IT-related business services are important for the promotion of IT as well as the creation of local employment opportunities. Employment can be generated both directly at the community centre and indirectly when access to business services for local companies is improved. An example of this double impact is a South African entrepreneur who, after having taken a two-day book-keeping course, was able to generate his own income by the marketing of business services from a community centre to local shops. Such a service would be an obvious extension of the services provided by tele-centres already having a computer and offering ordinary typing services.

Many tele-centres provide business services such as word-processing, although services such as book keeping are not offered. It is likely that there is a market for such services, but many of the tele-centres—especially those located in the rural areas—do not have the expertise to deliver them.

7.5. Creation of local employment

The direct generation of employment at Ghanaian tele-centres is limited as most centres only employ one or two persons. However, the revenue generated may constitute important extra cash income in small rural-based communities.

Local employment can also be created both by improvement of the local business environment as described above, and through different types of telework or distance work.

Telework in its traditional sense is practised on a major scale in a small number of developing countries such as India and the Philippines. In these countries transnational companies are taking advantage of low labour costs in their out-sourcing of information processing activities such as book-keeping. This type of activity demands a certain level of skills and is located in tele-centres in major cities, where both qualified labour and adequate telecom access is available. Consequently it is not an obvious option in rural areas.

However, rural tele-centres can enable local businesses to expand their market as they can receive orders and make offers by phone or fax. The market in Akatsi benefits from the fact that the tele-centres enable people coming from the neighbouring villages to make telephone calls on visits to the town.

8. Conclusion

"Information technology, and the ability to use and adapt it, is the critical factor in generating and accessing wealth, power and knowledge. Africa is, for the time being, excluded from the information technology revolution, if we except a few nodes of finance and international management directly connected to global networks while bypassing African economies and societies" (Castells, 1998).

In Africa the penetration of phone services is only 15% of the world average and for more advanced ICT services the figures are even lower. Tele-centres offer a low-cost opportunity for providing local communities with access to these services. The idea of tele-centres has been taken up, both by telecom operators who have established commercially oriented tele-centres on a franchise basis and by international donor agencies such as the ITU, FAO and UNCTAD, who have established multipurpose community centres in a number of countries.

The development of tele-centres has varied in different parts of the world, and the number of tele-centres differs widely from country to country. Developments in Ghana differs both from the franchise model adopted by a national telecom operator and the community centre model adopted by international donor agencies both in regard to funding and the type of services offered.

Tele-centres in Ghana have been set up without any type of financial support. This is reflected in the kind of services provided as they focus on the currently most profitable service namely telephony. Many of the centres complement the revenue from the tele-centre by combining several types of businesses, such as su-su (a type of informal banking service), renting of video cassettes, gift shops, restaurants, etc.

Although it is not their primary objective, they ease the access to telecom facilities in both rural and urban areas. They do not, however, engage directly in information activities in the way that this is achieved in the centres established by the ITU or other donor agencies.

Commercially oriented tele-centres can also contribute more directly to the supply of non-commercial activities related to the enhancement of local economic and cultural development in peripheral rural regions, if somebody is willing to pay for their services. This could be a local government authority that wishes to out-source a part of its obligations to the local tele-centre. Tele-centres can carry out services on behalf of local authorities and thereby generate income for themselves. This model has been used with success in some of the Scandinavian countries. Here the most successful model seems to be a centre generating its own income but related to local development movements—private or public. Public support is reduced to initial funding and the buying of services from the local tele-centre.

In Australia public funding is provided on an on-going basis. Although the grants given are limited, this has resulted in a growing number of tele-centres and very high penetration compared to the number of inhabitants. This has enabled the to maintain a strategic focus on community impact rather than on the generation of income.

The economic viability of Ghanaian tele-centres may be threatened by growing competition from telephone booths and private phones. If they are unable to renew their range of services they will have to close down as did many of the Scandinavian centres focusing on computer access . Only a few of the existing centres in Ghana will be able to manage such a re-orientation of their activities without support for the development of IT skills. If tele-centres are upgraded to supply e-mail and other Internet services this will greatly enhance the rural communication infrastructure. Internet services can also easily be combined with informational services on market information, agricultural consultancy services, etc.

Information services could rely partly on information provided by development assistance projects. In this way tele-centres would increase the outreach of these projects and generate employment and income for themselves. Tele-centres in developing countries make an important contribution to their information structure. The Ghanaian tele-centres have been established without any support from local authorities, telecom companies or international development agencies. It can be argued that these centres are not real tele-centres, but just small businesses. Nevertheless, they do contribute to the local communications infrastructure and the business environment. Limited financial support and national co-ordination can increase this contribution substantially, ensure their profitability and consequently enable them to supply, in addition, other types of community services.

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