IN A field just outside the village of Bumwambu in eastern Uganda, surrounded by banana trees and cassava, with chickens running between the mud-brick houses, Frederick Makawa is thinking about tomatoes. It is late June and the rainy season is coming to an end. Tomatoes are a valuable cash crop during the coming dry season and Mr Makawa wants to plant his seedlings as soon as possible. But Uganda's traditional growing seasons are shifting, so he is worried about droughts or flash floods that could destroy his crop. Michael Gizamba, a local village-phone operator, offers to help using Farmer's Friend, an agricultural-information service. He sends a text message to ask for a seasonal weather forecast for the region. Before long a reply arrives to say that normal, moderate rainfall is expected during July. Mr Makawa decides to plant his tomatoes.

A few miles away in the village of Musita, Michael Malime, another village-phone operator, explains how his customers have been using the same service to get farming tips. Rice farmers who had trouble with aphids texted for advice and received a message telling them how to make a pesticide using soap and paraffin. A farmer with blighted tomato plants learned how to control the problem by spraying the plants with a milk-based mixture.
The Farmer’s Friend service accepts text-message queries such as “rice aphids”, “tomato blight” or “how to plant bananas” and dispenses relevant advice from a database compiled by local partners. More complicated questions (“my chicken’s eyes are bulging”) are relayed to human experts, who either call back within 15 minutes or, with particularly difficult problems, promise to provide an answer within four days. These answers are then used to improve the database.

Farmer’s Friend is one of a range of phone-based services launched in June by MTN, Google and the Grameen Foundation’s “Application Laboratory”, or AppLab. As well as disseminating advice in agriculture, provided by the Busoga Rural Open Source and Development Initiative, the new services also provide health and market information. The Clinic Finder service points people to nearby clinics, and the Health Tips service explains the symptoms of common diseases.

Lastly there is Google Trader, a text-based system that matches buyers and sellers of agricultural produce and commodities. Sellers send a message to say where they are and what they have to offer, which will be available to potential buyers within 30km for seven days. Mr Makawa says his father used the service to look for a buyer for some pigs, which he sold to pay school fees. These services cost 110 shillings ($0.05) a time, the same as a standard text message, except for Google Trader, which costs double that. In their first five weeks the services received a total of more than 1m queries.

A web of sorts

“There is a big shift from holding a phone to your ear to holding it in your hand,” says David Edelstein of the Grameen Foundation. “It opens the door to information services. It’s not the web, but it’s a web of services that can be offered on mobile devices.” As with the Village Phone project, Grameen is trying to establish a model that can be scaled up and replicated in other countries. Offering agricultural and health information is more difficult than offering a phone service, however, because such information must be localised and must take cultural differences into account. The answer is to work closely with local partners, says Mr Edelstein. Grameen is also experimenting with the idea of “community knowledge workers”—local people who can help others get access to mobile services, reading, translating and explaining text messages where necessary, just as village-phone operators provide access to basic communications.

Trading up

Grameen’s collaboration with MTN and Google in Uganda is just one of dozens of services
across the developing world that offer agricultural, market and health information via mobile phones. In India, for example, farmers can sign up for Reuters Market Lite, a text-based service that is available in parts of India. Its 125,000 users pay 200 rupees ($4.20) for a three-month subscription, which provides them with local weather and price information four or five times a day. Many farmers say that their profits have gone up as a result.

Tata Consultancy Services, an Indian operator, offers a service called mKrishi which is similar to Farmer’s Friend, allowing farmers to send queries and receive personalised advice. “The rural population is willing to pay substantial subscription fees to get this information multiple times a day,” says Kunal Bajaj of BDA. There have been lots of pilot schemes in the past, he says, but commercial offerings are now beginning to gain ground.

Nokia, the world's largest handset-maker, launched its own information service, Nokia Life Tools, in India in June. In addition to education and entertainment, it provides agricultural information, such as prices, weather data and farming tips, that can be called up from special menus on some Nokia handsets. The basic service costs 30 rupees a month, and a premium service which provides detailed local crop prices in ten states is available at twice that price. “It is in its early stages, but it has resonated extremely well with its target audience,” says Olli-Pekka Kallasvuo, Nokia's chief executive.

Services to help farmers have been most widely adopted in China, where China Mobile offers a service called Nong Xin Tong in conjunction with the agriculture ministry, as part of its push into rural areas. It has already signed up 50m users and is aiming for 100m within three years. The service provides news, weather information and details of farming-related government policies.

China Mobile also runs a website, 12582.com, that sends farmers information about planting techniques, pest management and market prices. The service, which costs two yuan ($0.30) a month, sends out 13m text messages a day and has over 40m users. There are dozens of other examples across the developing world. TradeNet, launched in Ghana in 2005, now links buyers and sellers of agricultural products in nine African countries; CellBazaar provides a text-based classified-ads service in Bangladesh.

Mobile phones are also being used in health care. One-way text alerts, sent to everyone in a particular area, can be used to raise awareness of HIV; sending daily text messages to patients can help them remember to take their drugs for tuberculosis or HIV. Mobile phones can be used to gather health information in the field faster and more accurately than paper records and help with the management of drug stocks. Camera-phones are used to send
pictures to remote specialists for diagnosis.

Bright Simons, a Ghanaian social entrepreneur, has devised a phone-based system called mPedigree to tackle the problem of counterfeit drugs. Some 10-25% of all drugs sold are fakes, according to the World Health Organisation, and in some countries the proportion can be as high as 80%. Under Mr Simons’ scheme, which is being implemented in Nigeria and Ghana, a scratch-off panel on the packaging reveals a code which can be texted to a special number to verify that the drugs are genuine. Most mobile-health projects are still at the trial stage, but a report compiled in 2008 by the UN Foundation and the Vodafone Foundation documented around 50 such projects across the developing world. Studies are now under way to quantify their benefits.

These new services have become feasible because mobile phones are increasingly ubiquitous. “We are now in a new phase where we are seeing the network effects of so many people using mobile phones,” says Mr Simons. His system can, for example, safely assume that the pharmacist in any given village will have a mobile phone. These text-based services, though they fall short of full internet access, have the potential to unlock a range of social and economic benefits to users of even the most basic mobile phones. “There’s a lot of talk about what you can do with more sophisticated devices, but it’s much more compelling when you focus on the devices that people have in their hands today,” says Mr Edelstein.

**Money talks**

Quantifying the benefits of agricultural and health services is hard, and such services are still in their early days in much of the world. The mobile service that is delivering the most obvious economic benefits is money transfer, otherwise known as mobile banking (though for technical and regulatory reasons it is not, strictly speaking, banking). It has grown out of the widespread custom of using prepaid calling credit as an informal currency.

Suppose you want to send money from the city back to your family in the country. You could travel to the village and deliver the cash in person, but that takes time and money. Or you could ask an intermediary, such as a bus driver, to deliver the money, but that can be risky. More simply, you could buy a top-up voucher for the amount you want to transfer (say, $10) and then call the village-phone operator or shopkeeper in your family’s village and read out the code on the voucher. The credit will be applied to the phone of the shopkeeper, who will hand cash to your family, minus a commission of 10-20%. In some countries, where airtime can be transferred directly from one phone to another by text message, the process is even simpler: load credit onto your phone, then send it to someone on the spot who in return gives
cash to your intended recipient.

These methods became so widespread that some companies decided to set up mobile-payment systems that allow real money, rather than just airtime, to be transferred from one user to another by phone. Once you have signed up, you pay money into the system by handing cash to an agent (usually a mobile operator's airtime vendor), who credits the money to your mobile-money account. You can withdraw money by visiting another agent, who checks that you have sufficient funds before debiting your account and handing over the cash. You can also send money to other people, who will be sent a text message containing a special code that can be taken to an agent to withdraw cash. This allows cash to be sent from one place to another quickly and easily.

Some mobile-money schemes also allow international remittances; others issue participants with debit cards linked to their mobile-money accounts. Since there are many more mobile phones and sellers of mobile airtime than there are cash machines and bank branches, mobile money is well placed to bring financial services within reach of billions of “unbanked” people across the developing world.

The biggest successes in this field so far have been Gcash and Smart Money in the Philippines, Wizzit in South Africa, Celpay in Zambia and, above all, M-PESA in Kenya, which has become the most widely adopted mobile-money scheme in the world. Launched in 2007 by Safaricom, Kenya's largest mobile operator, it now has nearly 7m users—not bad for a country of 38m people, 18.3m of whom have mobile phones. M-PESA's early adopters were young, male urban migrants who used it to send money home to their families in the country. But it has since become wildly popular and is used to pay for everything from school fees to taxis (drivers like it because it means they are carrying less cash around). Roughly $2m is transferred through the system each day, with an average amount of $20. “In markets in Kenya, stallholders are happy to take M-PESA payments. It's pretty dramatic,” says Bob Christen, head of the “Financial Services for the Poor” initiative at the Bill & Melinda Gates Foundation.

Making it easier, quicker and cheaper to transfer money has enormous social and economic benefits. Commissions are lower, and recipients no longer have to pay for transport to towns.
to make withdrawals. They can also take out funds more easily and frequently. In rural households that have adopted mobile money, incomes have increased by 5-30%, according to Olga Morawczynski, an ethnographer at the University of Edinburgh who has studied M-PESA in detail. It also saves men working in the city having to take time off to deliver the money to their families. The only drawback, say their wives, is that some men now visit home less frequently.

**A safe place for savings**

M-PESA is also used as a form of savings account, even though it does not pay interest. Having even a small cushion of savings to fall back on allows people to deal with the unexpected, such as suddenly having to pay for medical treatment. “An awful lot of people climb out of poverty every year, but a lot drop back in because they have no savings, no buffer, so when something bad happens they have to sell assets and lose a lot of ground,” says Mr Christen. Poor people tend to save by buying livestock, which can get sick or die, or buying gold, which can be stolen, or investing in community-based schemes that may be fraudulent, says Timothy Lyman of the Consultative Group to Assist the Poor (CGAP). Mobile banking offers a more reliable alternative, he says, and could have economic benefits comparable to those of mobile phones.

Given all these benefits, why has mobile banking taken off in Kenya and a few other places but not elsewhere? M-PESA did not do well in neighbouring Tanzania, for example. There were special factors that made M-PESA more likely to work in Kenya: the unusually high cost of sending money by other methods; the unusually large market share (80%) of Safaricom, the main mobile operator (an affiliate of Vodafone); the regulator’s decision to allow the scheme to proceed, even without formal regulatory approval; and, most intriguingly, the post-election violence in the country in early 2008. M-PESA was used to transfer money to people trapped in Nairobi’s slums at the time, and some people regarded M-PESA as a safer place to store their money than the banks, which were entangled in ethnic disputes. All this makes Ms Morawczynski think that Kenya’s success in mobile banking may not be matched elsewhere. “But I hope somebody can prove me wrong,” she says.

There are signs that her wish may soon come true. Banks and regulators, which have been sceptical towards mobile money in many countries, are coming around to the idea, in large part because of M-PESA’s success. “Many of the issues that seemed to be significant stumbling blocks last year seem less significant now, or at least more manageable,” says Mr Lyman. There has, he says, been a “change in the comfort level” about non-banks (ie, operators) providing financial services. “A year ago most banks were scared—they were
seeing the mobile guys taking their lunch away,” says Dare Okoudjou, head of mobile money at MTN. But now, he says, some banks have realised that teaming up with a mobile operator to launch a mobile-money service will allow them to reach many more customers. After all, mobile operators have far more powerful brands and much greater reach than banks.

Regulators, meanwhile, are reassured by the banks' involvement. Mobile-money schemes generally limit balances and transfers (typically to around $100), which helps allay fears about money-laundering. And when customers sign up, they have to produce some form of identification. That makes the process more formal than for buying a SIM, but less rigorous than for opening a bank account. “We can find a balance between those two,” says Mr Okoudjou.

MTN's launch of a mobile-money service in Uganda in March 2009, in partnership with Stanbic Bank, provides further cause for optimism. MTN backed up its launch with a huge marketing campaign based around the simple idea of sending money home, as Safaricom had previously done in Kenya. After three months 60% of the population had heard of the service—a level of awareness that M-PESA took a year to achieve, according to MTN. After four months the service had signed up 82,000 users. Of the $5.1m transferred in that period, half was in the fourth month, indicating a rapid take-off. MTN plans to increase the number of outlets that can handle mobile money to 5,000 by early 2010.

Banking for the unbanked

MTN's apparent success in Uganda seems to suggest that Kenya may not be a one-off after all. After fine-tuning its technology and procedures in Uganda, MTN plans to introduce the service in 20 other African and Middle Eastern countries; it has already launched in Ghana. Meanwhile Zain, which operates in several African markets, has started its own mobile-money service, called Zap. According to CGAP, there will be over 120 mobile-money schemes in developing countries by the end of 2009, more than double the number in 2008. By 2012, it predicts, some 1.7 billion people will have a mobile phone but no bank account, and 20% of them will be using mobile money.

Operators do not expect to make much money from mobile banking, says Mr Okoudjou, but it can help keep customers from defecting to rivals and cut costs by allowing people to top up their airtime directly on their phones, as well as providing wider social and economic benefits that reflect well on operators. Most importantly, he says, mobile banking can help the industry repeat the huge impact made when mobile phones were first introduced. “This is a second wave that can unleash the potential of mobile phones again,” he says. “So we need
to do this, and we need to do it properly, and we need to do it all over.”

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