ICT & information dissemination

Should the numbers always do the talking?

Market Development Facility
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Summary

Information and communication technology (ICT) provides an appealing technological solution for development interventions, one that can efficiently deliver services to large numbers of underserved people in hard to reach places.

ICT has sometimes been heralded as a revolution for agricultural development. The Market Development Facility's (MDF) experience highlights that strategic, well-targeted ICT interventions can deliver meaningful impacts. Where appropriate technology exists, these interventions can overcome geographic barriers that hamper more conventional interventions.

ICT is considered an effective means of reaching large numbers of people with information, ideas and advice–helping to overcome some of the geographical and cultural barriers to large scale interventions. It reduces the need for expensive and time-consuming one-on-one communication methods. However, this paper contends that ICT is not a panacea. It should complement face-to-face interaction, but it cannot replace it entirely. ICT can relay a diverse range of information, but not every type of information relayed can or will be used effectively by its recipients without also being packaged in a way that is relevant to the end user. Often, tailored and context-driven content, communicated by voices that users recognise or relate to, is crucial in ensuring that information is actually understood and used.

The paper presents some of the lessons learned from the MDF's ICT interventions in Pakistan. It explores an example of one ICT-focused intervention, the conditions that were considered when designing the intervention, and the extent to which these conditions contributed to its effectiveness.

MDF

Market Development Facility (MDF) is an Australian Government funded multi-country initiative which promotes sustainable economic development, through benefits for poor women and men. These benefits generally take the form of more employment or increased income, but often also include less tangible elements such as time saved or increased agency for women. MDF seeks out markets that are central to the livelihoods of large numbers of people, but which are not performing to potential. It connects individuals, businesses, governments and NGOs with each other, and with markets at home and abroad. This enhances investment and coordination and allows partnerships to flourish, strengthening inclusive economic growth.

In Pakistan, MDF completed 59 interventions in the livestock, leather and horticulture sectors, working with a range of market players from rural entrepreneurs to multinational companies across different regions to stimulate large-scale sustainable impact. While Pakistan is a large economy, MDF has focussed on the more challenging areas of the economy, where access to transport, information and markets is constrained. Within agriculture, MDF's partners were input companies, food and dairy processors, financial service providers and a telecommunications firm.

The case for ICT-based solutions

In 2019, Sher Wali, a potato farmer from Chitral in Khyber Pakhtunkhwa (KPK) province in Pakistan, lost almost 1,000kg of potatoes, worth USD 150, due to unexpected rainfall. This was a small fortune for a farmer in the borderland areas with limited sources of income. Sher Wali had been hesitant to trust weather reports from local news stations because they provide generalised district-level information that is typically inaccurate for his area. Since Chitral has low population density and is surrounded by mountains, extension workers seldom visit, so his access to other sources of information is limited. Sher Wali is not alone. Large numbers of smallholder farmers in borderland areas, from Baluchistan to KPK and Gilgit-Baltistan (GB), suffer from the effects of sudden weather changes and lack information about good cultivation practices. This reduces their crop yields and quality and ultimately affects their incomes. After last year's harvest Sher Wali learnt of a service launched by his telecommunications provider that uses automated calls and SMS to provide weather forecasts and crop advice directly to his phone. He hopes that this will enable him to take better precautions against or respond rapidly to changing weather conditions, as well as getting useful advice for cultivating his crops.

The service that has come to Sher Wali's attention is an example of information dissemination through ICT.

Agriculture, ICT and the quest for information

ICT refers to all communication technologies, including internet, mobile and wireless networks, computers, television and radio and any other device or application that enables users to access, retrieve, store, transmit, and manipulate information in a digital form. Mobile cellular networks have expanded rapidly in the developing world because they are cheaper to establish and operate than landline and broadcast-based networks, and mobile phones are more affordable than televisions and personal computers. Pakistan's teledensity (mobile cellular subscriptions for every 100 individuals) increased from 0.22 per cent to over 78 per cent between 2000 and 2019. In contrast, in the last decade fixed land line subscriptions have declined by 25 per cent. Mobile telecommunications are therefore an obvious medium to reach large numbers of people spread across distant and sparsely populated areas. Mobile telecommunication networks have the additional benefits of being able to target specific users by using geo-tagging and segment users based on their revenues, usage history and other variables.

Challenges in connecting with farmers and agri-businesses in Pakistan's borderlands

It takes about four and a half hours to drive from Lahore, a city in the heart of Punjab, to Islamabad, Pakistan's capital, a journey of 350km. To travel a similar distance from Gilgit-Baltistan (GB) to Chitral takes three times longer, because of winding, unsurfaced roads through difficult terrain. GB and Chitral have a combined area of about 72,000km^2, 96 per cent of which is mountainous, with a population of 2 million people, equating to a population density of about 27 people/km^2. Baluchistan, another remote borderland region, has a density of 35 people/km^2. In contrast, the more prosperous and central provinces of Punjab and Sindh have densities of 536 and 345 people/km^2 respectively. The Karakoram Highway has made central locations in borderland areas easier to reach over the years, but settlements that are not situated close to the highway remain as disconnected as ever. Harsh weather conditions hamper logistics and often leave remote populations completely isolated during certain periods of the year. Farmers in these areas are even more scattered and inaccessible, often cut off from other farmers, middlemen and extension workers, leaving them with unreliable access to goods, services, markets and information about crop cultivation, animal husbandry and weather.

Public extension support is scarce because government workers lack adequate travel budgets, hence they are not able or willing to cover extensive territories to meet small numbers of farmers. If they do manage to interact with farmers, the information that they provide is often not timely or reliable. The private sector faces the same logistical challenges, and the business case for providing agricultural inputs and information or buying produce in these areas is often unfavourable when compared to more easily accessible regions, except for crops that are scarce, have a high value-to-volume ratio, and are non-perishable and easy to transport.

Identifying a viable ICT-based solution and service provider

The inherent geographical constraints of the borderland areas led MDF to explore ICT-based information models and, in particular, opportunities for telecommunication service providers.

Telenor is the second largest telecommunication company in Pakistan, with over 40 million subscribers and considerable market share in rural and borderland areas. Despite being the third entrant into the Pakistan market, Telenor has surpassed other operators due to its willingness to expand its network into more marginal areas. Its model is to offer value-adding services to attract and retain subscribers in a market characterised by intense price competition and declining tariffs, with the aim of maintaining revenue and minimising subscriber churn.

In late 2015, Telenor began a weather alert and crop advisory service – *Khushal Zamindar* 7272 – in Punjab, the agricultural hub of Pakistan. Telenor had a sizeable rural base in Punjab, with more than 16 million subscribers, making it the ideal region in which to launch the new service—they were able to draw on a wealth of information about existing subscribers, reducing the amount of research required before launch. However, Telenor's research and product design team did still conduct detailed interviews with farmers to inform the design and content of the information service.

The free automated call and SMS service focused on farmers with large landholdings cultivating major crops like sugarcane, wheat, rice and cotton. Telenor aimed to make its service indispensable for farmers, securing their loyalty and therefore ensuring that they would keep Telenor's SIM card in their phone and continue making calls, sending text messages and using other charged services. According to research by GSMA, a year after the service launched subscribers had contributed to an increase in average revenue per user (ARPU) of 3.5 per cent for Telenor's core services compared to non-users, while monthly churn was 1.8 per cent for users compared to 3.1 per cent for a comparable base of non-users.

As the service grew in popularity in Punjab, with over 4 million users by mid-2017, Telenor began to look for new areas to expand its footprint. Its challenge in taking the service to other parts of the country was that it required local information, and outside of its Punjab base, it was not as specialised in agriculture, so information was more difficult to come by. It needed an experienced partner that understood agriculture and local farmers' constraints.

At this time MDF was exploring ways to reach farmers in borderland regions and increase their access to relevant information. MDF wanted to focus on types of information that could change farmer behaviour and be delivered sustainably. MDF's research has also identified the lack of localised, accurate weather forecasts as an opportunity. Weather forecasts from the Meteorological Department were generalised for entire districts and the absence of timely, accurate weather forecasts created problems for farmers during sowing, harvesting and post harvesting. In Chitral and GB, with highly localised weather systems, this was resulting in serious losses for farmers during vegetable harvesting, fruit picking and drying.

Telenor was an appealing partner for MDF because it had telecommunications capability, had undertaken research and launched a farmer-focused service through its own initiative, and had a business model that was driven by commercial objectives and feasibility. MDF's experience with partners in a diverse range of contexts over the years has taught it that the sustainability of interventions hinges on finding the right type of partner – one with sufficient capacity and motivation, particularly when entering more challenging markets.[1]

MDF had learned from Telenor's existing service in Punjab that farmers responded rapidly to weather advice but were more hesitant to act on crop cultivation advice. Changes in weather are readily verifiable, so farmers could judge whether Telenor was providing them with accurate information within a day or two. On the other hand, crop advice can only be validated at the end of the crop cycle and is therefore a greater 'leap of faith' for farmers. However, farmers' trust in Telenor's weather information service was undermined in instances where district-level information rather than localised information was provided. Inaccurate weather alerts caused farmers' to be even more hesitant about crop cultivation advice provided by Telenor.

[1] In reference to MDF's partnership with Telenor

MDF's intervention with Telenor

Accurate weather information seemed central to the *Khushal Zamindar* 7272 service: it was the information that was most likely to trigger a change in farmer behaviour, but it also acted as a gateway through which farmer trust could be established, making it more likely that they would also act on crop-related information.

Consequently, the partnership between MDF and Telenor focused on developing localised solutions that would not only enable Telenor to provide reliable weather information (to a 5km^2 radius) to farmers in GB and Chitral, but also in all other regions where Telenor's service was present, including Punjab. The weather service used was global, and much more accurate than what was available through other channels, making it a reliable option for farmers.

An important component of the intervention was research. MDF had a variety of partnerships with fruit processors, vegetable seed producers and other agri-businesses across GB and Chitral. MDF supported Telenor to tap into this network, to learn from businesses and farmers directly: what type of common issues were being faced for which crops, how many times weather information was required per day, which times of the day farmers needed the information and the best ways to provide information so that it was easily understandable. This enabled Telenor to customise its methods for providing advice, so that information was not only localised but also relatable. For example, it created memorable and relatable human characters to deliver the information in a manner that farmers were more likely to listen to and learn from, instead of using robotic voices to issue technical instructions. Making information more practical was found to greatly increase the likelihood of its application. For example, when the service tells farmers that there is a 64 per cent probability of 10mm of rain today, farmers might read or listen to the information but not act. Conversely, if the service informs farmers that it will probably rain today and that it would be best not to water or spray crops with pesticides, farmers are more likely to act. Simplifying the information and including a call to action increases the chances of influencing behaviour.

Results achieved – and the challenge of measuring impact of ICT interventions

MDF uses three metrics to assess the impact of its interventions: 'access', 'use' and 'benefit'. In the case of Telenor's *Khushal Zamindar* 7272 service, access was defined as the number of farmers who listened[2] to information received from the service at least twice a week. Telenor and MDF were keen to identify repeat listeners. Use was defined as a subset of access and only included those farmers who could be verified to have acted on information that they received through calls. Benefit was defined as the number of farmers who benefited monetarily from acting on the information, a subset of use. Access was something that could be captured through Telenor's routine subscriber data. Use and benefit had to be measured by MDF using a survey triangulated with other available data.

The objective of MDF's measurement was to estimate how many people had increased their income as a result of acting on information provided by Telenor's service, and the value of that monetary benefit. It proved easier to verify the impact of weather-related information than that of the crop-related advice provided by the service. There were records of specific weather events and weather forecasts, and farmers could recall taking measures to protect their harvest, delay sowing seeds or applying pesticide and other actions in response to those events. The efficacy of crop-related advice proved more difficult to identify, as many other variables could also affect yields and income, such as the availability and quality of inputs, soil conditions, seasonal diseases and market prices. Therefore, the impact data only captures the weather-related component of the service.

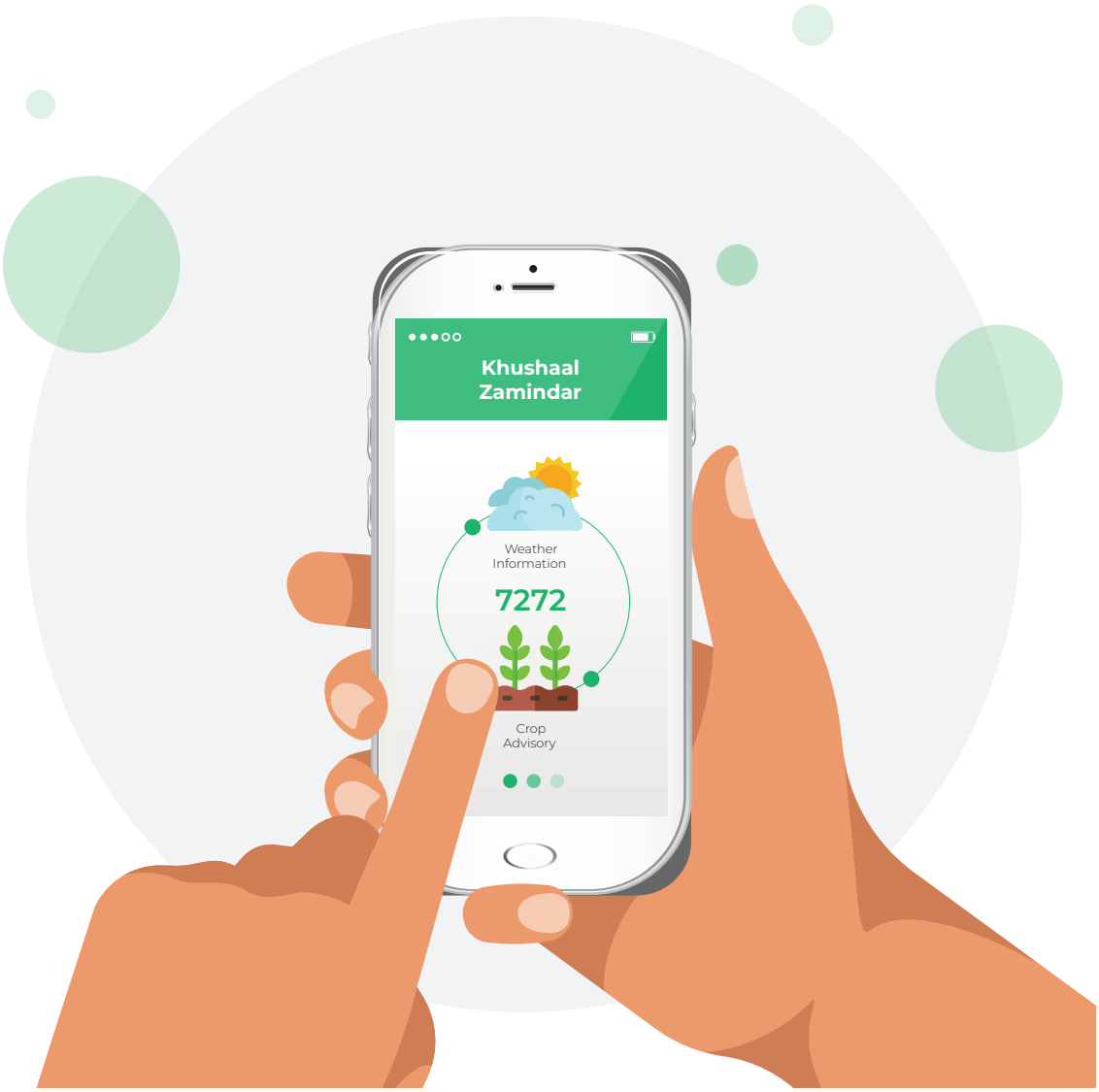
Table 1: Results from MDF-Telenor intervention (2019)

Access:	150,132 farmers
Use:	79,617 farmers
Benefit:	73,247 farmers. The average annual increase in income per household due to a reduction in weather-related crop losses was USD 125. For context, in 2008, per capita income averaged USD 190.

[2] Access was defined as only those who listened to the automated calls. It proved too difficult to measure who had read an SMS or not. For this reason, access (and therefore use and benefit) figures are likely considerably understated.

Telenor's data indicated that there were 150,132 people who listened to the service at least twice a week (i.e. access). Using a 95 per cent confidence interval with a 5 per cent error margin, it was determined that a survey sample size of 383 respondents would be representative in order to estimate use and benefit. The size and geographic spread of the sample meant that a telephonic survey was the most practical method of assessment. MDF held talks with Telenor to ascertain whether it could provide the telephone numbers of farmers subscribed to *Khushal Zamindar* 7272, but Telenor's internal data privacy policies prohibited this. Therefore, an independent firm specialised in telephonic research had to be commissioned to undertake this additional research. Finding such a firm was a challenge because it required an organisation that had access to a large enough database of Telenor subscribers in GB and Chitral to be able to cover the required sample. The survey took approximately 10 minutes to conduct for each respondent and mostly consisted of closed questions. MDF conducted a random quality check of responses by independently calling respondents to verify information recorded by the research firm.

Given MDF's aim of delivering and measuring systemic change, the program has also been interested in the sustainability of the service after its support to Telenor ended in 2019. Telenor experienced an encouraging response from the GB and Chitral markets, in terms of content engagement, revenue generation and churn minimisation. It has continued offering *Khushal Zamindar* 7272, and gone on to strengthen it with additional products, such as health insurance. With the rapid spread of the COVID-19 health crisis, Telenor has also utilised the high outreach of its service in GB and Chitral to provide subscribers with information about precautionary measures, and intends to offer reimbursement for COVID-19 related expenses under its health insurance.



Lessons learned

MDF's experience with Telenor in Pakistan's borderlands offers some simple lessons about developing and delivering effective ICT-based information solutions for remote areas. MDF's experience with Telenor in Pakistan's borderlands offers some simple lessons about developing and delivering effective ICT-based information solutions for remote areas.

Be realistic about what ICT can achieve

The reason that ICT is appealing — a technological solution that can efficiently deliver services to huge numbers of underserved people in faraway places — also points to its potential pitfalls. ICT-based solutions are often seen as remotely delivered, stand-alone game-changers that can overcome and solve deep-seated problems. This has risks for users and service providers, and development agencies.

A service delivered remotely perpetuates the separation between service provider and user, making it difficult to understand needs, build trust, capture feedback and measure effectiveness. The effectiveness of a stand-alone solution is often undermined because users remain isolated from the other things that they need to make the best use of it. For service providers a stand-alone solution can be difficult to deliver because they are disconnected from the context and networks needed to develop a relevant service in a commercially viable way.

Development agencies are faced with the same problem as service providers: the prohibitive cost of maintaining a broad network of field offices mean that often they too are distant from the people that they are trying to reach and disconnected from context and networks. They often expect ICT-based solutions to be able to do too much. They make them comprehensive, trying to fix every problem with a single intervention. However, in doing so it can also make the services unwieldy to set up, deliver and measure, and unfeasible to sustain itself in the longer term. Additionally, not all types of information are well-suited to ICT communications — messaging can become confused and difficult to act upon. Two-way media are expensive and complicated to operate, so many ICT-based solutions are one-way channels, meaning that recipients are unable to ask questions, unlike a conversation between a farmer and another farmer, extension officer, input retailer or trader. Trust is one of the most important determinants of whether recipients will change their behaviour after receiving information. Acting on agricultural information via ICT feels riskier, because it is not coming from a recognised source of expertise or experience.

To overcome this trust deficit, ICT-based solutions are likely to be more effective if they supplement the operations of existing market actors that already have relations with farmers. For example, if the weather service is promoted or endorsed by local input suppliers that can also provide agronomic solutions to farmers, or by buyers that have an interest in ensuring a reliable supply of produce from farmers.

Get the marketing right

Getting the basic '4 Ps' of marketing – product, price, place, promotion – right was ultimately what led Telenor's *Khushal Zamindar* 7272 to be successful.

Specificity: Content (in this case localised weather forecasts and advice) needs to be specific, understandable and measurable. Its tangibility to users helped build their trust, upon which other services could be provided. This also made it easier to measure the usefulness and impact of the service.

Business model: Telenor did not see *Khushal Zamindar* 7272 as a stand-alone service, but as a gateway to other revenue-generating services. Because poor farmers are typically unable to pay for these kinds of services it requires an ICT provider with the capacity and incentives to invest in a 'loss-leader' service, and the capability and ambition to build up a broader range of services over time.

Positioning: Telenor might not have launched a service in the borderlands had it not been positioned to understand the context of these remote regions. It gained this understanding through MDF. Similarly, MDF would not have been able to add value to Telenor if it had not already been positioned in the borderlands, having gathered intelligence about and developed partnerships in several agriculture markets in the borderlands. Developing *Khushal Zamindar* 7272 on a stand-alone basis would have been a costly – and possibly less effective – venture for Telenor and for MDF.

Impact of COVID-19 and the trend to digitisation

The COVID-19 pandemic, lockdowns and social distancing are likely to accelerate the drive to digitisation and remote service delivery. Improved ICT-based services unquestionably have the potential to benefit rural households and businesses with more relevant and timely information. But better-informed households and businesses still require physical infrastructure, goods, services and networks to be able to act on that information optimally to improve their livelihoods. ICT can be an important complement or enabler in remote areas, but not a miracle worker.

As Sher Wali counts the bags of potatoes harvested from his field, he notices how he not only managed to cover the losses of last year due to better harvesting practices, but also had some additional yield this year, which he could attribute to better crop management practices. His phone buzzes with the daily weather forecast for today, with sunny weather predicted, which means that he can take his produce to market for selling without the danger of it getting drenched in the rain. For Sher Wali, it seems like the sun has finally broken through the clouds, in more ways than one.

• Fiji: Garden City Business Park, Grantham Road, Suva, Fiji
• Timor-Leste: 2nd Street, Palm Business & Trade Centre, Surik Mas, Dili
• Sri Lanka: No. 349, 6/1, Lee Hedges Tower, Galle Road, Colombo 03, Sri Lanka
• Papua New Guinea: Level 6, PwC Haus, Harbour City, Port Moresby, Papua New Guinea

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