Facilitating development through the use of mobile phones

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Abstract

The 'Utilising mobile phones for development in PNG study' has consisted of three pilot research projects conducted during 2012-2013. These three 'mobile phone for development' (M4D) pilot projects have been run simultaneously in order to synthesise lessons learnt in a coherent manner. The study has been conducted in partnership with the Government of PNG, with funding from the Australian Government. This paper presents cross-sectoral lessons learnt from the three research projects. All three projects have now been completed and show very pleasing results, leading to a strong indication that strategic use of mobile phones can aid service delivery and socio-economic development in PNG. It is intended that the paper would be useful for any organisation or individual considering the incorporation of mobile phones into service delivery in PNG.

Key words: Australian aid, communication, mobile communication network, mobile phone, Papua New Guinea, phone, telephone, text message.

Introduction

Mobile phone network coverage has spread across many parts of Papua New Guinea (PNG) since mid-2007, due to the introduction of competition into the mobile sector (Watson, 2011a; 2011b). The majority of the citizens of PNG reside in rural areas (National Statistical Office of Papua New Guinea, 2004). In rural areas, there is very limited access to modern communication devices such as landline phones, public phones, fax machines and postal services (Intermedia, NBC, ABC International Development & AusAID, 2012; Watson, 2013) or to media products such as daily newspapers and television (Watson, 2011b). Use of computers and computer-based communication such as Internet and email is rare (Watson, 2011a,; 2011b). Radio broadcasting is the only medium that is widely accessible in rural areas, apart from mobile phones (Intermedia et al., 2012; Watson, 2011a; 2011b; 2013).

There are currently three mobile phone operators in PNG: Digicel PNG, bmobile Vodafone and Citifon (a subsidiary of Telikom PNG). An additional licence has been granted to a new player, which is expected to enter the market in the near future (Post-Courier, 2014). There are approximately three million mobile phone users in PNG (International Telecommunication Union, 2015). Increased mobile phone access has raised questions as to whether the newly available technology could be used to address urgent service delivery needs, particularly in rural areas of the country (Watson, 2012).

The 'Utilising mobile phones for development in PNG study' has consisted of three pilot research projects conducted during 2012-2013. These three 'mobile phone for development' (M4D) pilot projects have been run simultaneously in order to synthesise lessons learnt in a coherent manner. The study has been conducted in partnership with the Government of PNG, with funding from the Australian Government. The three research projects included: a maternal health phone line (Watson & Sabumei, 2013a, 2013b, 2013c), a data collection project using mobile phone text messaging (Watson, Keris, & Eliakim, 2013; Watson & Morgan, 2013, 2014), and a controlled trial in which resources were sent to teachers using mobile phone text messaging (Kaleebu, Gee, Jones, Jauk, & Watson, 2013; Kaleebu, Gee, Maybanks, et al., 2013).

This paper outlines briefly the three research projects and presents cross-sectoral lessons learnt from the three projects. All three projects have now been completed and show very pleasing results, leading to a strong indication that strategic use of mobile phones can aid service delivery and economic development in PNG. It is intended that the paper would be useful for any organisation or individual considering the incorporation of mobile phones in service delivery in PNG.

Trial project in health sector: Childbirth emergency phone

The Childbirth Emergency Phone project involved the establishment of a free-call phone number for rural health workers to phone when patients experience childbirth complications. Research findings indicated that the project led to improved communication (Watson & Sabumei, 2013a) and beneficial health outcomes for patients (Watson & Sabumei, 2013c). The pilot project in Milne Bay Province was handed over to the Milne Bay Provincial Health Authority in celebratory ceremonies in both Alotau and Port Moresby in October 2013. The local authority is continuing to support the program and pay the phone bills, which is a positive outcome for health workers, women and families throughout that province.

This research project has determined that two-way communication through voice calls can assist in health service delivery. Rural health workers use mobile phones to consult with staff in the labour ward of Alotau Provincial Hospital, who give real-time advice during time-critical medical emergencies, particularly birthing complications. In such cases, "improving direct communication to a referral obstetrician can make a difference" (Kirby, 2011, p. 59) with respect to the number of women dying during labour. Rural health centres have also been issued with solar panels for charging mobile phone batteries.

Trial project in law and justice sector: Village courts data

A trial project to collect data utilising mobile phone text messaging has been completed in the law and justice sector in partnership with two government agencies: the Village Courts and Land Mediation Secretariat and Magisterial

Services. The aim of this trial was to determine if data collection via mobile phone is more effective than other data collection methods, such as asking officers to post or fax paper forms. The trial involved the electronic submission of data related to village courts using mobile phone text messaging.

The data collected was about cases referred to district courts by village courts. In 2011, all district courts were asked to return completed paper forms on relevant cases from a two-month period. Only one district court returned data. In 2013, useful data was collected using text messaging from 35 district courts around PNG (Watson & Morgan, 2013, 2014). Thus, the trial has shown that data collection through text messaging can be valuable, speedy and cost-effective in accessing data from around PNG.

The analysis has found that data collection through mobile phone text messaging is a useful tool in the PNG context. The project suggests that the use of mobile phones could prove very useful, time-efficient and cost-effective in evaluations and reviews requiring complex data collection, good sample size(s), and valid information. There is strong potential for this methodology to reach remote and previously excluded participants. In any sector, more effective data collection could create a strong evidence base and therefore lead to beneficial policy creation.

Trial project in education sector: SMS Story

The SMS Story project was designed and implemented by the Voluntary Services Overseas (VSO) Education Program. The trial involved sending daily mobile phone text messages to teachers in rural elementary schools (Grades 1 and 2) using a free, open source software program called Frontline SMS. Text messages contained lesson plans and short stories that teachers wrote on the blackboard and used in other classroom learning activities

The trial was a controlled trial, in which half of the teachers involved received text messages and half did not. In term 1 of 2013, the reading ability of nearly 2500 students was assessed in elementary schools in Madang Province and Simbu Province. During term 2 and term 3, a text message service was offered to teachers in half of those schools. An end-point reading assessment was conducted in term 4 to determine if the text messages for teachers had any impact on students' reading ability.

Students whose teachers received the text messages improved more in the reading test than students whose teachers did not receive the text messages. It was found, using statistical testing, that the reading ability of children in the active group (in which teachers received text messages) was significantly higher than the reading ability of children in the control group (in which teachers did not receive the text messages) (Kaleebu, Gee, Jones, et al., 2013). Thus, it can be said that a daily mobile phone text message to elementary school teachers in PNG boosted students' reading ability. The success of SMS Story signifies the value of using mobile telephones to support rural-based

workers throughout PNG, and in particular teachers in remote schools (Kaleebu, Gee, Jones, et al., 2013).

Cross-sectoral lessons learnt

Overall, the 'Utilising Mobile Phones for Development in PNG study' has indicated the potential for mobile phones to effect positive change in PNG. The value of having conducted three research projects across different sectors is that evidence is now available to inform policy deliberations. This part of the paper will outline twelve lessons learnt from the three concurrent projects, with an emphasis on those lessons that can be applied across sectors. Each lesson learnt will be discussed in general terms and then in relation to the three projects, as applicable.

1. People do own or have access to mobile phones. This has been true in all three projects implemented, meaning that rural-based workers do use mobile phones. During fieldwork for the Childbirth Emergency Phone project, it was found that most health workers owned mobile phones (Watson & Sabumei, 2013b; 2013c).

   In the SMS data collection project in the law and justice sector, all of the 39 participating clerks owned or had access to a mobile phone. One clerk who was approached was unable to participate in the trial due to not owning or having access to a mobile phone. Another clerk was unable to participate as there was no second phone available for training purposes (training involved speaking on one phone with a trainer while sending and receiving text messages on another phone) (Watson & Morgan, 2013).

   In SMS Story, it was found that many teachers in rural elementary schools own or use mobile phones. Baseline data revealed that 91.9% of the teachers in the study own mobile phones (n=114). The technology has also been used by many teachers for some time: the mean length of time that teachers had owned a mobile phone was 2.7 years (Kaleebu, Gee, Jones, et al., 2013).

2. Voice calls and text messaging or Short Message Service (SMS) work well in the PNG context. Complex technical literacy is not required to be able to receive phone calls, make phone calls, receive text messages or send text messages. Voice calls and text messaging can be undertaken with any phone handset, meaning that specialist handsets or specific types of phones are not required.

   Data on handset types were not collected in the Childbirth Emergency Phone project. In the law and justice sector, over a third of participating clerks possessed basic phones with limited functionality, nearly half of the clerks had an advanced phone (that is, one that included a camera), while just a very small number owned smartphones with Internet access (Watson & Morgan, 2013). In SMS Story, 70.5% of the teachers in the

trial reported having a basic phone, while 23.8% had advanced phones and 5.7% owned smartphones (Kaleebu, Gee, Jones, et al., 2013).

3. Recharging of mobile phone handset batteries remains a challenge in locations without mains electricity supply. This problem was identified in previous research undertaken in rural areas of PNG (Watson, 2011b, 2013) and it has been evident in the three research trials. Solar chargers were provided to rural health facilities throughout Milne Bay Province in order to ensure that health workers can keep their handset batteries charged and ready to be used during childbirth emergencies. Thirty rural health workers were interviewed and although no question specifically addressed the distribution of solar mobile phone chargers, ten interview participants mentioned they were very happy with the project distributing solar mobile phone chargers, saying it has solved their problem of charging their mobile phone batteries (Watson & Sabumei, 2013c). Having a fully charged mobile phone at hand saves time during emergencies.

   In the case of the SMS data collection project, most participating clerks said they have access to mains electricity supply either at the courthouse or at home (32 out of 39 participating clerks; of the remainder, two charge their batteries using a diesel generator at home and five clerks regularly pay to charge their phone battery at a trade store) (Watson & Morgan, 2013). The challenge of recharging mobile phone batteries did not appear to be a noteworthy obstacle to participation in the SMS data collection trial. During nine in-depth research interviews conducted with participating clerks, only one mentioned battery recharging as a concern, particularly during regularly occurring, extended power outages.

   In relation to SMS Story, the only expense mentioned by teachers involved in the project was in relation to making sure that their phone batteries remained charged. Around half of the teachers surveyed identified mobile phone charging as a cost incurred while participating in the project (53%; n=44). Of those teachers who paid to recharge their batteries, they spent on average two kina per recharge (Kaleebu, Gee, Jones, et al., 2013). This was the only cost attached to using the SMS Story service, and had no apparent impact on the levels of participation among teachers.

4. Phone numbers change. In PNG, people's phone numbers change quite often, due to handsets being lost, stolen, broken, given away, inadvertently locked or churned (meaning that a phone number can be discontinued by a mobile phone company if it has not been used for some time). All projects which require listings of participating phone numbers must devise and include strategies to deal with the fact that phone numbers do change.

   In the case of the Childbirth Emergency Phone, this challenge did not apply as access to the emergency phone number was not restricted to a list

of incoming phone numbers. Rural health workers were able to phone from any phone. This was beneficial as it was envisaged that if a health worker's mobile phone ran out of battery power, they could use another handset (for example, a handset belonging to a patient's family member) to phone the emergency number again.

In training conducted with participating clerks at the outset of the SMS data collection project, clerks were encouraged to note down the project contact phone number on a piece of paper and pin it to their office wall. Clerks were repeatedly asked to contact the project phone number in the event of a phone number change. Some clerks did do so during the project life, while others did not (this information was ascertained by contacting the person through an office number or the phone number of a colleague) (Watson & Morgan, 2013).

During the life of the SMS Story project, some teachers contacted the contact phone number, usually by text message, to notify of a phone number change. The project team felt that generally teachers were keen to notify them of a phone number change as they did not want to miss out on receipt of stories and lesson plans via SMS.

5. It is possible to conduct training remotely, through the use of telephony. A user-friendly, question-and-answer approach can be implemented with over-the-phone training, thus mitigating the need for target group members to undertake costly travel to attend face-to-face training. The Childbirth Emergency Phone project allowed individual capabilities of health workers to improve (Watson & Sabumei, 2013c) as phone calls involved not only service delivery, but also informal, on-the-job training for participating staff at both ends of the communication chain.

   Remote training was a key component of the data collection project in the law and justice sector. The trial was testing the effectiveness of remotely collecting data from isolated and dispersed locations. Therefore, the methodology of conducting training over-the-phone, rather than asking clerks to travel to attend face-to-face training was an appropriate technique to employ. Before the commencement of the two-month-long data collection period, clerks were contacted by phone and invited to participate in one-on-one, over-the-phone training. The script used during the training (Watson & Morgan, 2013) commenced with an explanation of the project and its purpose. This was followed by a session in which the trainee sent and received text messages, with guiding prompts, instructions and questions being provided by the trainer verbally. In many cases, the latter session occurred during a second phone call, at a convenient time designated by the trainee. This session was followed by an informed consent process and the collection of useful data about the trainee, such as demographic information and additional contact details for a colleague, in the event of a mobile phone number not being serviceable. The over-the-phone training included repetition of key information and also allowed repeated opportunities for participants to

ask questions. Over-the-phone training took longer than anticipated as some clerks were unavailable or unreachable when first contacted.

Compared to other data collection methods, there was a high rate of return during the SMS data collection project: 35 out of 39 trained clerks returned useful data (Watson & Morgan, 2013). This shows that the remote training worked and is a methodology worth attempting in other projects. In addition, during the data collection period, weekly reminder text messages proved to be an effective way to prompt recipients to send in information.

In the case of SMS Story, teachers participating in the trial received a cartoon poster explaining how to use the daily text messages. They did not receive any in-service training, aside from an explanation about how to use the poster. The first text message each school day included a short story. The second text message on each school day contained a lesson plan. Thus, the first message increased the amount of available reading resources in each school, while the second message was a training component of the trial. Given the success of the trial in improving students' reading ability, it is possible to suggest that the series of lesson plan text messages provided an effective and useful training sequence for participating teachers. Teachers reported an increase in the implementation of teaching strategies appropriate to teaching reading (Kaleebu, Gee, Jones, et al., 2013). The daily messages served as frequent reminders, encouraging the teachers to teach reading. Importantly, SMS Story did not require any teacher to be absent from a class for training.

6. It is possible to conduct research remotely, through the use of telephony. In research, phone interviews can be valuable, cost-effective and time-efficient. The telephone interview technique has challenges associated with it, but it creates opportunities to reach otherwise excluded populations and it saves both time and travel costs. The CallSafe application can be used on a Samsung Galaxy S2 or S3 to record phone calls. Alternatively, a simple tick-sheet or a spreadsheet can be used (Kaski, Mursau & Maybanks, 2014). As in all research, the writing of questions is crucial, to ensure that relevant and useful information is collected.

   Phone interviews were not used in the health project. In the SMS data collection project, phone interviews were used to good effect. Semi-structured interviews were conducted with selected clerks during the trial. These interviews aimed to gain feedback, experiences and other qualitative data. The audio of these interviews was recorded using CallSafe software, by Electrodata. The calls were made with a Samsung Galaxy S3 phone as this is the required platform to run the CallSafe software. Interviews were later transcribed and then reviewed by searching for key themes. An advantage of recording phone call audio is that exact wording of quotes can be transcribed and utilised in reporting (Watson & Morgan, 2013).

In SMS Story, phone interviews with teachers several weeks into the trial resulted in a change to the timing of outgoing messages, based on the feedback received (Kaleebu, Gee, Jones, et al., 2013). Phone interviews are a valuable way to ascertain the views of text message recipients.

7. Stakeholder engagement is crucial. Without the interest and support of relevant government authorities at both national and local levels, the three research projects would not have been able to proceed. It is important that researchers and project implementers allow time and resources for events such as project launches, mid-point reviews and final presentations of results and certificates. Local events in provinces should be held shortly before events held in Port Moresby.

   In the health project, events were held in Alotau before similar events were held in Port Moresby within the following week. In the SMS data collection project in the law and justice sector, a steering committee was formed so that key officers from the two government agencies involved could participate. Committee meetings were held at alternate offices, with the role of meeting chair also alternating. All key decisions were made jointly by the heads of the two agencies involved. For SMS Story, a project advisory group was established. Group members included representatives from relevant divisions within the Department of Education, as well as provincial representatives and other key stakeholders.

8. Stakeholder consultation is essential and should begin early in the project scoping and design phases. In all three projects, it was very important to understand stakeholder concerns and processes. In the health project, early consultation with the management and staff at Alotau Provincial Hospital established that the existing protocol restricted advisory roles to medical officers. Therefore, establishing authorisation for labour ward staff to give advice over the phone was a crucial early step in the process of establishing the phone line.

   In the SMS data collection project, stakeholder consultation was a vital part of designing and writing the SMS questions. Wide consultation during the writing process ensured that questions collected the required data and included appropriate options for responses. Questions were then tested with members of the target group from three diverse provinces before being finalised. For SMS Story, stakeholder consultation took place with national agencies and also provincial authorities.

9. Text messages need to be written so as to be clear and concise. Text messages were not used in the health project. In the SMS data collection project, SMS questions were written clearly (Watson & Morgan, 2013). The text messages were also tested with a small group of clerks, to ensure their clarity. Correct grammar, spelling and punctuation were used in the

SMS Story text messages to ensure that teachers were teaching reading correctly.

10. Prank calls can be received by free-call numbers. Prank calls are to be expected and planned for. Prank calls to a free-call number can be limited by only disseminating a free-call phone number to the intended target group. In the case of the Childbirth Emergency Phone, announcements about the project were aired on the local radio station. Announcements were addressed to health workers and included reference to the free-call phone number. Public broadcasting of the phone number led to certain individuals making prank calls to the free-call number. The exact number of prank calls received is unclear, but there was certainly a spate of such calls around the time when radio announcements aired. At other times, there were no prank calls. Prank calls were irritating for labour ward staff, particularly if they were attending to patients at the time of the call.

    The prank calls ceased following implementation of three strategies: staff at the local radio station were asked to avoid publicising the phone number; a message from the head of the local health authority was broadcast on the local radio station appealing to people not to call the number unnecessarily; and labour ward staff asked callers to think about how it might feel if their wife, mother, sister or daughter was in pain due to delays caused by unnecessary calls. Such strategies could be employed again from time to time as the need arises.

    An important lesson is to avoid broadcasting a phone number to the public in any way, including through radio broadcasting or publicly available printed materials. It is imperative in projects of this nature to ensure that phone number access is limited to the target group. If appropriate, target group members could be asked to keep the phone number confidential. Unfortunately, for phone numbers which are available to the public, it is expected that prank calls would be received. If a phone line is to be available to the public, strategies to address anticipated prank calls should be developed during design and implementation. The other two projects did not include free-call numbers.

11. When establishing a phone line, it is valuable to provide coaching for the people likely to be answering phone calls. The coaching can include practice phone calls (also known as ‘role play’ calls). It may also be necessary to secure authorisation for officers to be able to respond to calls as needed. Forms or scripts for officers to use when handling calls should be kept simple, uncluttered and easy-to-use.

    At the outset of the Childbirth Emergency Phone project, coaching was provided to labour ward staff. The coaching included opportunity to role play phone calls of likely scenarios. An important process of stakeholder engagement took place, with health managers in the host province giving authorisation for labour ward staff members to be able to give advice during phone calls. This was a change of protocol and was a vital

precursor to implementation of the project. During the project, labour ward staff requested the simplification of the form used for handling calls. The new, preferred form is visually uncluttered and therefore less challenging for staff members to complete during phone calls (Watson & Sabumei, 2013b). The other two projects did not include free-call numbers.

12. Where they are available, networked computer databases offer a user-friendly system for entering data. In the health project, this finding is not relevant. In the SMS data collection project, clerks at district courts which have networked computer databases indicated that they prefer to use this system and find it easy to use. The system has drop-down menus in fields (boxes) on computer screens. Once data is entered, it is transmitted to Port Moresby. For clerks without access to a networked computer database, SMS was the preferred method for providing data. The two systems can be used in partnership, with SMS data linked to computer databases for places that do not have access to computer networks (Pact, 2014; RapidSMS, 2013). In the context of the remote schools involved in SMS Story, this finding is not relevant.

Conclusion

In the contemporary PNG context, there is an opportunity for strategic implementation of simple technology to contribute positively to socio-economic development and service delivery in rural areas. In the case of communication with rural areas, policy development should foreground the absence of electricity supply and advanced technologies. A key strategy which could have positive benefits would be to design interventions which utilise the simple technological devices that are present in rural areas. The basic mobile phone is in place and in use throughout many parts of PNG and could be utilised strategically to improve economic and social development. With specific reference to the PNG context, it is possible to harness the capacity of mobile phones in order to achieve impacts that can be positive, cost-effective and time-efficient.

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