

Can mobile phones really be used for data collection? Results from a trial in Papua New Guinea

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Abstract

Papua New Guinea (PNG) performs poorly on a wide range of development indicators and has topographical obstacles which make transport and communication costly, difficult and time-consuming. Data collection in PNG is challenging, particularly from rural and remote areas. This paper outlines the results of a trial project which has utilised mobile phone text messaging to collect data from around PNG. The analysis has found that data collection through mobile phone text messaging is a useful tool in the PNG context. It shows the potential for large-scale data collections in a context where communication systems are largely undeveloped and/or struggling. The project suggests that the use of mobile phone text messaging could prove very useful, time-efficient and cost-effective in research 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. The methodology can be complemented by qualitative research methodologies. The paper focuses on a research method which may be useful for implementation by government departments, non-government organisations, academics and others.

Key words: Australian aid, communication, law and justice sector, mobile communication network, mobile phone, Papua New Guinea, phone, political and government communication, telephone, text message.

Introduction

Papua New Guinea (PNG) has rich cultural heritage (Reilly, 2004) and abundant natural resources (Gouy, Kapa, Mokae, & Levantis, 2010), but performs poorly on a wide range of development indicators (United Nations, 2010). The country has topographical obstacles such as high mountains, wide rivers and islands which make transport and communication costly, difficult and time-consuming. Data collection in PNG is challenging, particularly the collection of data from rural and remote areas. This paper outlines the results of a trial project which has utilised mobile phone text messaging to collect data from around PNG.

The project involved the collection of data on the role of district courts in supporting village courts. The initiative followed a 12-month-long process of trying, unsuccessfully, to collect data using hard copy survey forms. Text messages containing questions were sent to clerks at district courts throughout PNG. Clerks received some introductory over-the-phone training. The frequency

and quality of their responses were tested. Clerks were also asked to rate their experiences.

Focus of this paper

The project involved the collection of data on the role of district courts in supporting village courts to use enforcement provisions allowed under the Village Courts Act 1989. The important role of village courts in the PNG law and justice sector is not the subject of this paper. This paper focuses on text messaging as a data collection methodology. To the knowledge of the authors, this is one of the very first instances of data collection of this type in PNG or the Pacific region. Indeed, this may be a first-of-its-kind project even further afield, as the use of mobile phones in data collection is a nascent field globally.

The paper presents a research method which may be useful for implementation by government, non-government organisations, members of academia and others. Please contact the authors should you want information on: the role of village courts, an identified urgent need for data on the role of district courts in supporting village courts, the trends identified in the data collected through text messaging, and detailed information about how to implement this methodology.

Short Message Service (SMS) data collection

In a two-month-long trial, questions were sent via mobile phone text messaging to the clerks at district courts who usually deal with matters relating to village courts. The data collected from the text messaged replies were specifically about cases referred to district courts by village courts, primarily focused on imprisonment orders.

This trial tested whether district courts are more willing and able to provide data on village court imprisonment orders if it is via a user-friendly mobile phone system. Text message questions were written with extensive consultation within the sector. In the design of the text message questions, wording was kept short and clear. There were two reasons for this approach. Firstly, short, clear questions are designed to be easy for users to respond to and secondly, each text message can consist of a maximum of 160 characters.

A software company designed an automated system, so that as a clerk sent in an answer the next question would automatically and instantly be sent to their phone. The design work was complex, as in many cases different answers required the system to navigate to specific alternate questions. A password-protected, web-enabled interface was available so that the two leading agencies could simultaneously access the data coming in through text messages. The interface showed real-time data coming in and created downloadable spreadsheet files.

For clerks, it was free-of-charge to send and receive text messages as part of this trial. Clerks could activate the system at any time by texting in the word 'start' to a short number (a 'shortcode') given to them during training. On Friday

mornings during the two-month-long trial, reminder text messages were sent to clerks. Before the commencement of the two-month-long data collection period, clerks were contacted through phone calls and were invited to participate in one-on-one, over-the-phone training. The script used during the training included an informed consent process and also the collection of demographic information and alternative contact details.

Research methodology

The aim of this trial was to determine if data collection via mobile phone is more effective than other data collection methods, for example the paper forms typically used. In the trial, questions were sent via mobile phone text messaging to clerks at district courts throughout PNG. The research question which this trial addressed was: *Is data collection via mobile phone more effective than other available data collection methods?* Sub-questions related to: advantages and limitations of the methodology and the technology, cost-effectiveness, time-efficiency, suitability and user experience.

Research was undertaken in an ethical manner (see Watson and Sabumei, 2013, p. 26). As part of the over-the-phone training process, all clerks were given a choice about whether or not they wanted to participate in the pilot. For semi-structured interviews, the clerks approached were given information designed to help them make an informed assessment as to whether or not they wanted to participate. Consent was recorded in audio recordings of the interviews. The identities of clerks who participated in the trial have been kept anonymous in all reporting.

The underlying epistemology in this trial was pragmatism (Creswell, 2003, pp. 11-12). Pragmatism is an understanding of knowledge which acknowledges that some aspects of the world can be measured whereas other facets of experience are perceived differently by each individual (Creswell, 2003, p. 12). In a research study, the approach taken refers to the theoretical perspective (Crotty, 1998, p. 5) or philosophical stance (Creswell, 2003, pp. 4-6) which informs the research. In this case, the approach adopted was a mixed methods approach, which is advantageous as it is not limited to a subjective worldview which focuses on each individual's own feelings, values, beliefs and perspectives, or an objective worldview which attempts to establish set, unchanging parameters which are measurable and quantifiable (Creswell, 2003, p. 12). The mixed methods approach was helpful as a foundation for this study as a quantifiable outcome was desirable, while social and process-related factors were also relevant. Mixed methods research can collect and analyse both qualitative and quantitative data (see Watson and Sabumei, 2013, p. 27). Quantitative data was gathered about the amount of data collected through text messaging and qualitative data was collated from research interviews. While outside the scope of this paper, analysis was also made of the information (both quantitative and qualitative) that was gathered through text messaging.

The strategy adopted was a concurrent strategy, meaning that qualitative and quantitative data were collected at the same time and were synthesised together

during data analysis (for more information and a diagram, see Watson and Sabumei, 2013, p. 27). Quantitative data has been closely examined for information regarding the efficacy of text messaging as a data collection tool. Meanwhile, qualitative data has been used to help understand how district court officers viewed and responded to the trial.

Research methods included: a two-month-long data collection trial using mobile phone text messaging; two quantitative surveys conducted as structured interviews over-the-phone with participating clerks; and semi-structured telephone interviews with a representative sample of participating clerks. The semi-structured interviews were conducted in order to allow clerks to reflect upon experiences related to the trial. These interviews aimed to gain feedback on the text messaging method adopted, and particularly whether or not it was deemed to be user-friendly. Such reflections were intended to assist in determining whether this method should be utilised to gather information in the future or on other matters. Semi-structured interviews were later transcribed and then reviewed by looking for key, common and repeated themes.

Significance of the research

The spread of mobile phone reception across PNG in very recent years (Watson, 2012, pp. 46-47, Watson, 2011, Watson, 2013) has provided a unique opportunity for remote data collection to be trialled. Mobile phone text messaging or Short Message Service (SMS) may be useful in the collection of data from around PNG. Text messaging is possible using all types of mobile phone handsets and does not require a data connection. If proven to be successful, data collection through mobile phone text messaging could have widespread benefits in a country where topographical obstacles, lack of infrastructure, and other impediments have made data collection persistently challenging.

For an individual to respond to a question sent via text message, that person does not require complex technical knowledge. Many people in PNG have learnt to send and receive text messages in recent years (Temple, 2011; Temple, Apakali, Bai, Dekemba, John, Matiwat, & Ginmauli, 2009). This trial tested whether questioning through text messaging is a system which works in the PNG context. If it is deemed to be worth pursuing, this form of data collection could be used in all sectors for a range of purposes. In the health sector, there have been some initial trials of data collection using mobile phones in PNG, but the key difference with this trial is that the health trials involved the use of specific types of handsets (Rosewell, Ropa, Randall, Dagina, Hurim, Bieb, Datta, Ramamurthy, Mola, Zwi, Ray, & Macintyre, 2013).

Results: Participating clerks

Magisterial Services indicated that there are 54 district courts throughout PNG and the Autonomous Region of Bougainville which deal with village court matters. Of these, 39 clerks at 39 district courts completed over-the-phone training for the SMS trial. At each location, the clerk trained was the person

responsible for village court matters at the time. For the 15 district courts not included in the trial, clerks at five of them were not functioning, while clerks at seven courts could not be reached. Of the remaining three: one could not complete the over-the-phone training as there was no access to a second phone to speak on while sending in practice text messages; one could not participate as they did not own a mobile phone; and one did not seem interested in the project.

The gender breakdown was fairly even, with 20 female clerks and 19 male clerks participating in the project. All of the 39 participating clerks owned or had access to a mobile phone. Of these, over a third had basic phones with limited functionality (15 out of 39), nearly half had an advanced phone with a camera (19), very few owned smartphones with internet access (4) and one was using a desktop mobile phone to participate in the trial. Most phones were in reasonable working order: 22 said their phone was working well, 14 said the phone was in 'average' condition and three clerks said their phone was in 'poor' working condition.

Clerks were asked whether they regularly sent and received text messages from the nominated phone. Most clerks were familiar with writing and reading text messages on the phone to be used during the trial (34 out of 39). Most clerks said they have access to mains electricity to recharge their mobile phone handset batteries, but five clerks need to pay each time their battery ran down. Clerks were asked about the quality of mobile phone network coverage at their office. Most were happy with the quality and reliability of the service available at their workplace: 27 rated the service as 'good', 10 rated the service as 'average' and two said the service was poor.

Clerks were asked questions about their access to other communication mediums. Few clerks have access to email (11 out of 39). Just over half of the clerks reported having access to a serviceable fax machine (22). Roughly half the clerks have a landline telephone available at the district court building (20). Most clerks were within a reasonable distance from a post office (37 out of 39).

Results: SMS data collection

Based on their text message responses during the two-month-long trial, clerks were categorised, as follows: any clerk who sent back no responses, or no useful responses, during the data collection period was categorised as 'non-active'; any clerk who sent back some useful messages, but did not send responses during every week of the trial was categorised as 'semi-active'; and any clerk who sent back complete data throughout the data collection period was categorised as 'active'. As can be seen in Figure 1, most of the 39 clerks sent some responses to questions sent to them via text messaging.

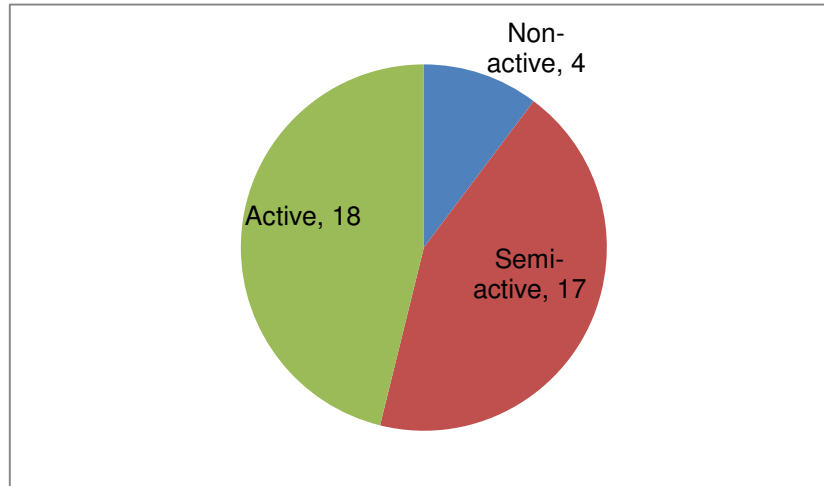


Figure 1: Categorisation of participating clerks

Structured interviews were conducted over-the-phone immediately after the data collection period ended. These interviews were conducted with 30 of the participating clerks (others could not be reached or were unavailable within the designated timeframe). Two of these had been categorised as 'non-active' and were therefore not asked some of the questions. Clerks found the process of responding to SMS questions easy (89.3% said it was easy, 10.7% chose a 'medium' level of difficulty and no-one classified the experience as difficult) (n=28). Over half of the respondents found the process to be quick, while some thought it was time-consuming (53.6% of respondents found the process quick, 39.3% found it to be taking a middling amount of time and 7.1% found the process to be time-consuming) (n=28). Participants enjoyed the experience of sending in data through SMSs (57.1% said it was fun, 39.3% medium and 3.6% boring) (n=28).

Of the 30 clerks interviewed at the conclusion of the trial period, roughly half of respondents have access to a networked computer database (16 out of 30). A question posed was: *'Imagine that Magisterial Services asks you to send some data to Port Moresby. You can choose how to send the data. Which method would you prefer to use?'*

Those respondents with computer database access were given four choices: post a form through PNG Post, send a facsimile using a fax machine, enter the data into the networked database on a computer screen at work, or respond to a series of SMS questions. Those respondents without database access were given just three choices to select from: post, fax or SMS. Table 1 shows responses for all of the end-point interviews. SMS was the preferred option, while roughly one-third of respondents were desirous of using the database rather than other options.

Table 1: Preferred data submission options

Preference	Count
SMS	16
Database	11
Fax	2
Post	1
Grand Total	30

Of the 11 respondents who preferred to use a networked database, all of them had access to the Magisterial Services networked database. The other five respondents who had access to this database preferred to use SMS for data submission. Three of these people mentioned that there had been problems with the database being offline, including system outages due to power blackouts. The remaining 11 clerks who preferred SMS questions did not have access to the networked database.

While these numbers are too small to allow for statistical testing, they represent a large proportion of the 54 clerks around PNG who deal with village court matters. Therefore, it can be reasonably concluded that SMS is the preferred option for people working in remote locations, particularly those without access to a networked database. On the other hand, where a networked computer connection is available, people prefer to enter work-related data onto a computer screen, rather than through a mobile phone handset.

Results: Semi-structured interviews

Semi-structured interviews were conducted with selected clerks from around the country through phone calls made to clerks during the final few weeks of the data collection period. Conversation during these interviews tended to focus on the processing of village court imprisonment orders at district courts. This information is outside the scope of this paper and is covered by the authors elsewhere (Watson and Morgan, 2013).

During the interviews, clerks were asked about their experiences of responding to the SMS data collection questions. Four clerks said that the SMS system is quick to use, while one said that it is time-consuming. One clerk talked about the SMS option being free-of-charge and in effect saving money as it is expensive to travel to the nearest post office to post paper forms. Two clerks expressed concerns about regular disruptions to mobile network signal, while two clerks said that the text messaging system is easy to use.

SMS question is like straightforward. It won't take long time. Because like when you send a message, I will reply back. So it's a quicker way of doing things. On the other hand, when we go through problem with network, it might complicate SMS system I think.

When given a choice of methods for sending data to Port Moresby, four clerks said that they would prefer to use a networked computer database, four clerks said they would prefer to use SMSs and one clerk said that completing a form and posting it would be the preferred method.

Discussion

The findings indicate that questioning through mobile phone text messaging can be a useful way of collecting data from contacts spread throughout PNG. Data received is timely, by contrast with a commonly used system of asking remotely based workers to post paper forms to a central office. There was generally a spike in activity on Fridays. This was due to a reminder text message being sent to clerks on Friday mornings during the two-month-long trial.

Clerks found the process of responding to SMS questions easy (89.3% said it was easy). Over half of the respondents found the process to be quick, while some thought it was time-consuming. Participants enjoyed the experience of sending in data through text messaging.

A previous data collection exercise was undertaken through a paper search during visits to selected district courts. Another data collection effort was undertaken using a paper form, given to Supervising Provincial Magistrates at a workshop held in Port Moresby. Only one district court returned data in the agreed timeframe using the paper form, for a number of reasons. While there were other benefits of holding a workshop, it was not an effective way of embarking upon a data collection exercise. There is a stark contrast between the amount of time, planning and resources involved in transporting people from across PNG to a workshop in Port Moresby, and the resulting data that was returned from just one district court.

It is fair to say that there was a substantial amount of input required in the current project. This was particularly so throughout the consultation process around writing the questions to be sent through text messaging. Even so, there has been a comparatively low level of involvement required, rendering useful data from district courts across PNG. Useful data has been collected from 35 district courts. This is a substantial body of data, compared to the results from a previous data collection exercise (see Figure 2). This process has been found to be more efficient and more effective than travelling to district courts or asking district courts to post in paper forms.

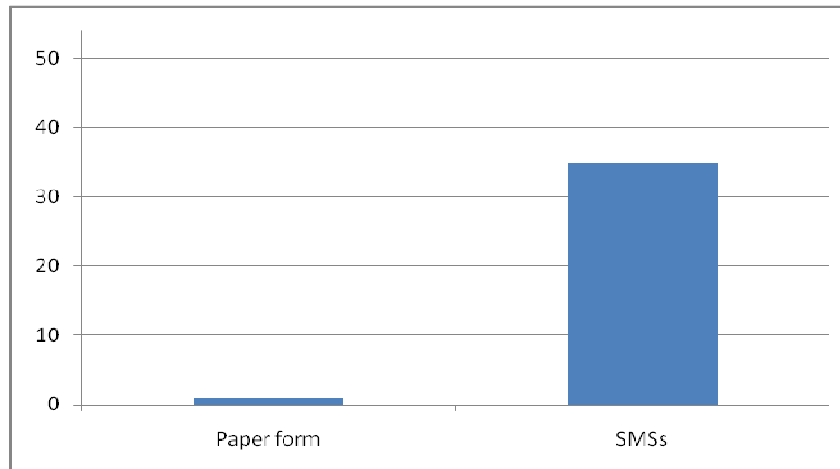


Figure 2: Number of district courts from which data was received in two different data collection efforts targeted at 54 district courts

Limitations

The trial was limited in timeframe and was seeking responses on very specific, narrowly defined items relating to village courts. Nonetheless, the findings about the data collection methodology may be generalisable to all sectors as the trial has been a useful test of the methodology itself. The trial has also attempted to take into account regional variations as it included semi-structured interview respondents from across the four regions of PNG and the Autonomous Region of Bougainville.

The trial tested a form of data collection which has been little used in PNG, if at all. While the people responding to questions using the data collection methodology have all been people who are employed, the data collection has included some quite remote localities. It is possible that future trials could include attempts to collect data from village-based people leading mainly a subsistence lifestyle.

Implementing the SMS data collection method

The use of SMS does not require a data connection or plan. It does not require an advanced phone. SMSs can be received and sent using any phone, from a basic, cheap handset through to the most advanced smartphone. SMS is quicker than posting forms, and does not require a large investment in technology or infrastructure.

SMS questions need to be written so as to be clear and concise. Wide consultation during the writing process will ensure that questions collect the required data and include appropriate options for responses. Questions should be tested with members of the target group before being finalised.

Weekly reminder messages proved to be an effective way to prompt recipients to send in information. On some occasions, there was confusion between the project manager and the software provider as to when to send the message out. A clear timetable indicating dates to send reminder messages would have been helpful.

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. It is important in project planning to think about the impact of people's phone numbers changing, due to handsets being lost, stolen or broken. In this project, there was a contact phone number provided and participants were encouraged to keep this number written in a safe location, rather than only saved in the contacts list in a mobile phone handset. They were also encouraged to contact the project phone number in the event of a problem with a mobile phone. Some clerks did contact the project phone when their phone number changed. However, not all officers thought to notify of a change in phone number.

Conclusions

The analysis has found that data collection through mobile phone text messaging is a useful tool in the PNG context. As one of the first instances of this approach being used in the Pacific region, the project has demonstrated the use of mobile phones in collecting data quickly. It shows the potential for large-scale data collections in a context where communication systems are largely undeveloped and/or struggling. The data collection methodology may be suitable for implementation in research projects addressing concerns or data needs in various sectors within PNG.

There are concrete advantages to using SMS for data collection in PNG. It is particularly suitable to collecting data from locations where there is no postal service, no electricity, and no landline telephones or fax machines. Even where these communication options are available, people enjoy the experience of sending in information in response to text message questions. It is recommended that data collection utilising SMS be undertaken whenever an organisation is trying to collect data from people in disparate locations across PNG.

The project suggests that the use of mobile phone text messaging could prove very useful and cost effective in research 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. The methodology can be complemented by qualitative research methodologies.

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