Paperless Surveys: Using Mobile Phones to Administer the Annual Outcome Survey

Information and communication technology (ICT) tools—hardware such as mobile phones and software applications such as Skype—are all around us: from the simple programme in our alarm clock to tablets and personal computers. Today, even orchards are managed by programmes that predict yields based on rainfall. ICT tools have revolutionised the way we work, especially how we deal with the mountains of data that accompany large-scale development projects.

Today, there are more than 900 million mobile phones in India and even the poorest households have mobile access. The Uttarakhand Livelihood Improvement Project for the Himalaya (ULIPH) saw this ICT expansion as an opportunity for improving the standard survey methodology used for the annual outcome survey (AOS).

Data collection for monitoring and evaluation (M&E) takes a great deal of time, staff hours and resources. When seeking to measure and compare the impact of interventions, quantitative data are very useful for providing hard evidence and demonstrating trends. Surveys are the most often chosen tool to collect these data. The idea was to try to simplify this massive undertaking by administering the surveys digitally, which allows for collection and processing of data in real time, while the survey was being conducted. The developed software application eliminated some of the conventional limitations associated with remote data collection and M&E but also introduced new challenges (e.g., no physical paper proof of the survey).

The Uttarakhand Livelihood Improvement Project for the Himalaya (ULIPH) has been implemented since October 2004 by the Government of Uttarakhand, India, with financial support from the International Fund for Agricultural Development (IFAD). It seeks to improve the quality of life and incomes of disadvantaged households in a sustainable manner by promoting improved livelihood opportunities and strengthening of local institutions. The principle of self-help is central to the approach, which focuses on empowering self-help groups (SHG) and developing community institutions. It provides a range of support services and linkages for the development of multiple sources of livelihood and access to markets.

Annual outcome survey

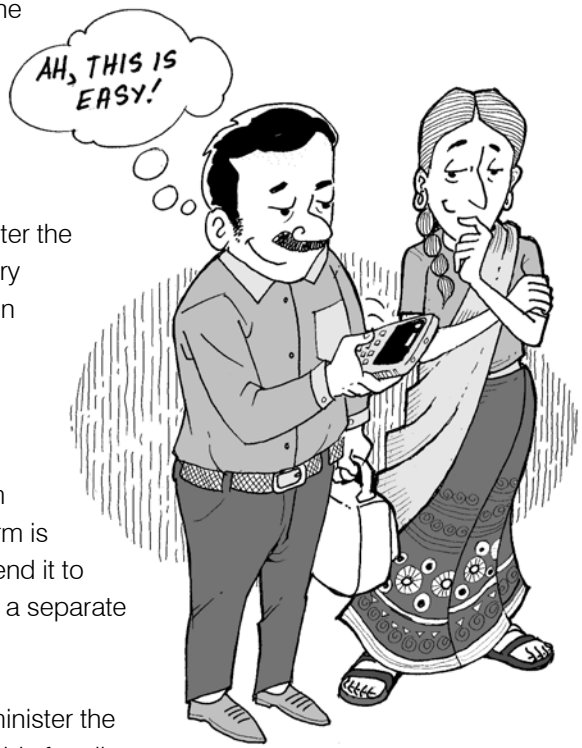
The annual outcome survey (AOS) is a tool used by IFAD to assess the outcomes of its project interventions. It is conducted annually and, in ULIPH, it was done in selected villages, including project beneficiaries and non-beneficiaries (as control group). Villages and households are chosen randomly by project staff, making sure that all intervention areas are included while preserving the wider applicability of the results. Indicators are staggered across beneficiary and non-beneficiary households and are content-specific (e.g., marine resources are not applicable in the context of Uttarakhand). Some of the indicators include female-headed households, participation in project activities, livelihoods, food security, land tenure, agricultural production and irrigation, access to markets, access to rural financial services, enterprise development and employment as well as access to natural resources. The final report compares the data from project beneficiary households and non-project beneficiary households to demonstrate the impact of the intervention. Also, a comparison is made with the survey results of the previous years, which provides indication of the trend in the development of the project, the sustainability of benefits and impact multiplier effects.

Traditional AOS

The faced the challenge of measuring the impact of its activities, spread across 959 villages and 3,962 community-based organisations (CBOs). ULIPH has been administering the AOS since 2010, using standard methodology. Paper questionnaires were filled out by trained surveyors during village visits. The completed surveys were brought to the project offices and coded, by typing the information into Microsoft Excel. The next steps involved checking data integrity, conducting an analysis, preparing tables and charts, followed by the writing of a report. It took quite a long time to complete a single survey (approximately 1 month), and it involved a lot of paper, staff hours and additional transport costs. During the transfer of data from the paper survey to the digital excel spreadsheet, inevitably mistakes were made that required additional cross-checking and extra work.

The innovation of web-based AOS

The difference between the standard AOS and new web-based AOS is in the delivery method and in the analysis. All of the usually very cumbersome tasks—filling out paper questionnaires, transporting and coding questionnaires, and finally aggregation of data and analysis—are automated. A web-based, real-time application was developed and was piloted during 2012 on a sample of 100 households. The results were used to introduce some user-friendly improvements (like the drop-down menus, or fine-tuning of some of the indicators) to be implemented in the subsequent AOS. The application is compatible with any web-enabled mobile phone and tablet (both are low-cost devices, easy to handle and transport). This software application provides a platform to deliver data in real time into a database on a remote server. (See box on the next page for technical details.)



The first step when the surveyor visits the household is to enter the fixed background information (country, state, district, category and year). Based on this information, the software application automatically assigns a unique ID number or code for each household. The starting time and household ID are locked and saved. The surveyor starts filling out the AOS survey by opening the form for the first indicator (e.g., land tenure). When the surveyor completes the first form, the second form is automatically opened and so on, until the last indicator form is completed. The surveyor can review the entire survey and send it to the server. The data for each form are saved by indicators in a separate line in the data table.

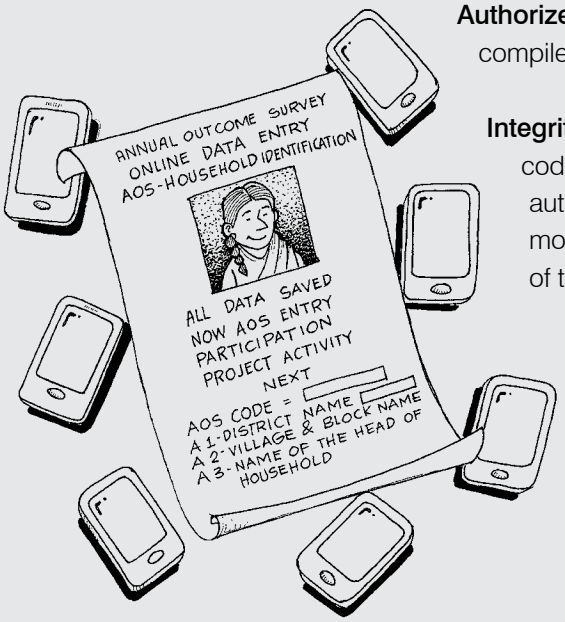
Each surveyor is required to log in before he or she can administer the survey, making it easy to trace and monitor progress. The fields for all the indicators are filled in by selecting the answer from a drop-down menu, which reduces data-typing errors. The application also captures additional information, including an image of the person or household being surveyed, the social and economic category, education level, number of family members, etc.

Software: Technical details

Various open-source software that are readily available have been used to develop the application. The Linux operating system is used for hosting the website. Apache is an open-source web server compatible with PHP and My-Sql. PHP is a software application used for operating servers and also for coding. My-SQL is a multithread, multiuser SQL database management system, used as a backdoor for accessing the database. We also include HTML5 and CSS3 to provide compatibility across multiple hardware devices. Unicode gives various choices for selecting multiple user languages. At present, it is available only in English and Hindi, but other languages can be included.

Improved data management

Managing survey data can be plagued by serious challenges at every step of data collection, processing and analysis. Due to problems with storage and unauthorised access, data can be corrupted or completely lost. Furthermore, the sensitivity of personal information and privacy concerns make it a priority to ensure authorised access and prevent misuse. The online AOS application provides the following safeguards:



Authorized access – Only authorized users can access the compiled data and modify content through the webpage.

Integrity and consistency – Every survey has a unique code. Upon completing a survey, a new code is automatically generated. The survey supervisor can monitor in real time each submitted form and the location of the surveyor.

Data storage – As soon as the survey is uploaded, it is saved in a remote server.

Automated analysis – Standardised graphs and charts for data analysis can be generated automatically with the software application.

Graphs and charts are generated after the household survey is completed and can be accessed through the web by authorised users. The appropriate indicator for which the graph/chart is to be generated is selected, and the software application produces the outputs. Incomplete data sets are not included in the analysis

but can be downloaded as raw data. There is less than 5% probability that the surveyor will not have mobile network coverage at the survey site. Should this problem arise, the survey can be completed in offline mode (using a form saved in TXT/XML format) and uploaded automatically when mobile network coverage is available.

The process of conducting the survey can be monitored by the administrator in the project office (or remotely), and the information can be reviewed online. This allows real-time tracking of results as they become available. The administrator has the benefit of being able to check multiple operational and analytical aspects of the administration of the survey: who among the surveyors are currently online, which households are being interviewed, what are emerging trends in the survey and others. (See also box on previous page for improved data management.)

Development and implementation challenges

- **Defining the unique code for each household and surveyor**
  The administrator defines the log-in profile for each surveyor (name and email). When the surveyor conducts the survey, his or her name and email with household key is locked in a separate table. This prevents duplication as all keys are generated automatically.
- **Form compatibility across different mobile phone devices (i.e., standardisation of font, size, menus, etc.)**
  In the early versions of the software application, standard small style sheets were used, which were not compatible with different phone screen sizes. This problem was solved by employing HTML5 and CSS3 sheets for designing cross-compatible style sheets. Also, the design of the graphs and tables was fixed.
- **Language and handset compatibility**
  The free text inputs cannot be saved on the My-Sql tables, and several mobile devices and tablets could not support these fonts. To address this challenge, the fonts were converted to UTF8.

Key benefits

- Time saved
- No typing errors in data entry
- Automated statistical analysis and generated graphs and charts
- Eco-friendly surveys: less transport, paper and electricity
- Real-time monitoring and evaluation
- Mobile phones can be used for other project related tasks

Opportunities and prospects

The application can be used for any IFAD project that conducts surveys. Only minimal adaptations of the form are needed (country, district, area and some changes to the question templates). The drop down menus can also be adjusted as needed. AOS is conducted every year in IFAD-funded projects, and the application can be further developed to generate **trend analysis** across previous years. Developing software applications for quick **cross tabulation** can help shed light on the root causes behind some of the results seen in the indicators at household level (for example, correlating and weighing low scores in 'Food Security' with other indicators like 'Lack of participation in project activity', 'no source of income', 'land ownership'). It can provide the analysis of which intervention areas have the most promising potential according to specific geographic location.

Other statistical tools can be added, for example, the **T & Z tests** commonly used for verification of results from small data sets. **Global Positioning System (GPS)** can be included with the software application. GPS can track location of household and surveyors in real time. This can capture potential migration trends or displacements due to natural disasters, such as floods. (GPS is not 100 % accurate in mountainous terrain but gives very good results in low-lying areas.) The web-based survey application can also be a useful tool for other beneficiaries and stakeholders. The application can possibly be integrated in other ongoing projects by any donor, implementing agency or government department, with slight modifications. It has the potential to greatly improve feedback mechanism between field staff and headquarters, and also helps improve transparency as well as rapid monitoring and evaluation of interventions.

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Acronyms and abbreviations

AOS	annual outcome survey
CBO	community-based organisations
GPS	global positioning system
HTML	hyper text markup language
ICT	information and communication technology
IFAD	International Fund for Agricultural Development
LAMP	Linux, Apache, MySQL, PHP
M&E	monitoring and evaluation
PHP	hypertext preprocessor
SHG	self-help group
SQL	structured query language
ULIPH	Uttarakhand Livelihood Improvement Project for the Himalaya
XML	extensible markup language

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