Doing Social Survey in Remote Rural Areas by Implementing the Mobile Ad-hoc Network: The Case in Orang Asli Village

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Abstract. Survey research is the most popular research design among the social scientist, especially in study of community and community's problem. The use of questionnaire as a tool for data collection is common not only for small-scale study but also for national census. However it is difficult to process the data and the preliminary findings instantly in remote areas using the conventional method. The larger the sample size, the more budget and time is needed) Considering the rapid grow of information and communication technology (ICT), mobile communication devices and the internet in our daily life, then it is the time to think the faster and more efficient method for social survey by applying the Mobile Ad-Hoc Network (MANET). Thus, this paper intends to classify and explore the implementation of Ad-Hoc Networking in conducting the social survey in the remote area such as in the Orang Asli village in Malaysia Main Range as a study area. In this article, we discuss the process of MANET development before, during and after the data collection occurred. We also discuss the importance of collaborating hard and social science to solve and study the community and its problem by using the Mobile Ad-Hoc Network.

Keywords: Survey, Remote area, Ad-hoc network, Paperless, Mobile laboratory.

1. Introduction

The best research is normally cost efficient, prompt output, sufficient and credible data for generalized to the populations and communities studied. Social science researchers often choose the survey technique, especially in community studies with larger parameter and sample size. Similarly, for the census activity. The conventional method of data collection faced some difficulties especially if it were to be conducted in remote areas, e.g.; jungle and hill sides such as in the village of Orang Asli (indigenous people). Thus, the activity needs more time, involves many human resources, and eventually increases the cost. Respondents normally feel bored because it usually takes a long period during the interview session. Researchers use only pen/pencil and paper, thus it needs times for data compilation (from paper to SPSS). As mentioned earlier, the conventional method also requires more human resources for data management and sometimes there are issues such as data inaccuracy, missing value due to human errors during data entry. Sometimes to complete one study, from the instrument development, data collection and data processing until report delivery to the stakeholders would take more than a year! Thus, in line with the advance in technology, the more practical and efficient method is created. Mobile Ad-Hoc Network is considered as a viable tool as well as a portable laboratory.

What is Mobile Ad-Hoc Networking? MANET is the new emerging technology which enables users to communicate without any physical infrastructure regardless of their geographical location (Goyal, Parmar & Rishi, 2011) and as an attractive concept particularly due to the robustness of the infrastructure even under disaster situations (Dhakan & Menezes, 2005). Mobile wireless nodes represent wireless devices carried by humans in most of the cases; hence the mobility pattern strongly depends on human movements which are

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influenced by human decisions and social behaviors. It is also applicable for audit study in forestry, palm oil, and sociologist had been applied in the study of disaster (Varda, Forgette, Banks & Contractor (2009).

According to Abbasi, Berg, Karlsen, Oldevick and Bye (2006), mobile ad-hoc networks, known as MANETs, represent a great potential for communication, interaction, and collaboration in a world with a rapidly increasing number of mobile (computing) devices. Wired sensor networks and the use of telecommunication gadgets such as online survey, PDA, iPad and notebook has long been used in social science to support the environment. Although recently the wireless sensors have been used only in areas where wired infrastructure is not available, such as in remote and hostile locations (Yoneki & Bacon 2005), yet the usage among social scientists is not popular than conventional method.

2. The Concept of Mobile Ad-hoc Network

The computer assisted self-interview can be operated both on-line and off-line. This paper explains the concept and process of MANET on-line survey - before, during and after data collection occurred.

2.1. The Admin and User Systems

For the purpose of data collection, there are two systems designed; the first one for the webmaster or administrator, and the second one is for the user's system as shown in Figure 1 and 2.

Fig. 1: System designed for webmaster.

Fig. 2: System designed for user.

Administrator system is used for database maintenance. Dummy data or data entry errors can be cleaned via the admin system. The admin system consists of four basic components namely as database, web server, web hosting control panel and upper-level user interface. The database used in this system is MYSQL. The SQL phrase stands for Structured Query Language. This database is an 'open source' database management system and is used in some of the most frequently visited websites on the Internet. This database is the world's most used open source Relational Database Management System (RDBMS) that runs as a server providing multi-user access to a number of databases. The second component is web server and in this project the 'open source license' web server known as Apache is being used. The purpose of Apache is to handle the complex communication between multi user input and the databases. The third component is the web hosting control panel that provides a graphical interface and automation tools designed to simplify the process of hosting a web site. Since we use the UNIX base web server and database, therefore the web

hosting control panel must be UNIX base as well. The most commonly used web hosting is known as CPanel. The purpose of CPanel is to control the various aspects of website and server administration through a standard web browser such as Internet explorer and Mozilla Firefox. The component number four for admin component is the upper level user interface. The basic interface was built using the Microsoft Access that allows the admin to monitor the progress of data entry without accessing the MYSQL.

The system for user is more simple consist of three components. However, two of the components, the database and the web server, are shared with the admin system. The only component known as active server page (ASP) works as data entry platform. The ASP looks like as a normal web page with the data input function. The page is easily developed using the Macromedia Dreamweaver software and perfectly displayed through the Internet Explorer and Mozilla web browser.

2.11. Before data collection – preparations needed are:

- Forming research team by consisting of social scientists and ICT experts.
- Preparing tools for data collection: wireless router, laptop/PDA/iPad, web camera, mobile laboratory (4WD), workstation, printer and IP camera.
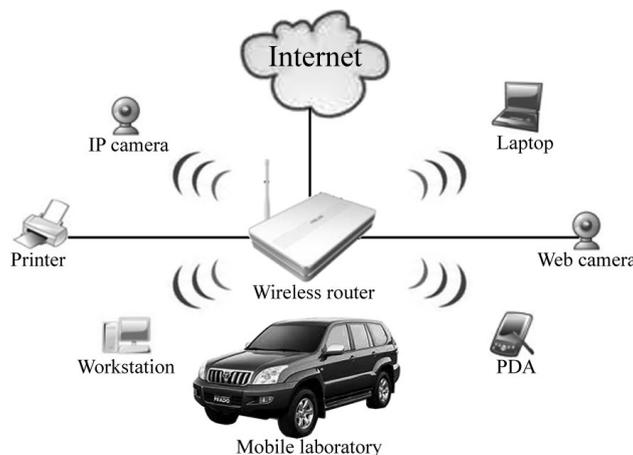

Fig. 3: The illustration of mobile laboratory

2.12. During the Data Collection:

- A briefing session with the Community Leader and the villagers to explain the purpose and the procedure of data collection. During this session, literacy screening is also carried out to strategize the mechanism of data collection. At early stage, we planned to apply Computer Assisted Self-Interview for literate respondent. Unfortunately, during the survey, we found that majorities of our respondent were illiterate. Moreover, this was the first time for computerized census was conducted onto them. Finally, we decided to use face to face interview to all respondents, and the answers were simultaneously recorded into the system by the researcher or trained enumerators.
- Since there was no electricity and network coverage in the village, the laboratory was set-up a day before the data collection with the trial run. The interview session took about two days and during that period a runner system was always standing by in the laboratory to ensure that the MANET is successfully operating.

2.13. After the Data Collection:

- Data collected was processed immediately after the interview session completed.
- An exploratory analysis on community profile was carried-out, and the output was shared with the community representatives for validation and confirmation. At this point, all ambiguities between two parties concerning factual were clarified.
- Further analysis which involved inferential statistic is ready to run once the step 2 above done.

3. Experiences with Mobile Ad-hoc Network

MANET is a simple system and very practical in social science research. We found that the use of MANET is an effective way to do a survey at remote area. However, the crucial issue related to MANET is the power consumption especially for the wireless router that consumes higher electricity than other MANET devices. The routers were supposed to be configured to provide the higher signal to wider the coverage especially under the rain forest canopy. The directional antenna and smart antenna system (Foutz, Govindarajula, Bahceci, Balanis, Sspanias, Capone & Duman, 2002) are highly recommended to be used for maximize the MANET coverage.

We have two options that are reasonable to be used as power supply; 1) rechargeable battery and 2) generator set. The rechargeable battery is portable and more convenience, especially for the location (areas) that cannot be accessed by any vehicle. However it cannot stand for a long usage, therefore, more batteries are needed. For areas that can be easily accessed using the truck are easier to deploy the MANET system and the generator set is recommended as a power source for data collection campaign. Please bear in mind, regardless what type of power supply is being used; the output power must be converted to 240 volt with 12A current rating. Fail to do so; you will cause damage to the electronic devices.

Among the advantages gained by MANET are:

- Time and cost saving

The method can help researcher to obtain preliminary findings during and before completing the fieldwork. The lack in data collection can be identified immediately and easily corrected. Thus, the missing value can be restrained as the data management being more efficient. In addition, the use of MANET is proven as cost saving for a research material because it is paperless. In contrast, conventional method use more papers for questionnaire, which needs more space to keep it safely, besides more budget is needed for printing.

- Immediate statistical result

Fast result will help the researchers to confirm whether the data are already reach the target or not, for a certain things may need immediate action, modify the questionnaire structure in immediately when the pre result aren't show the pattern. Validity and reliability analysis for the instrument also can be done during in the fields.

4. Limitation

The challenge we found during implementation of MANET in remote area is the accessibility of mobile lab in the thick forest. To solve this issue, researchers have to find out a suitable location at any open space nearby the village.

5. Conclusion

This paper discusses the usage of MANET as a tool for data collection in social research. This device is handy and practical to be used to survey communities in remote areas, and when there is also a need to generate quick results, while in the field such as producing a community profiling. This is permissible because, within the structure of the system, data can be easily compiled and coordinated at the center (mobile laboratory) from various surveyed locations. This system also could help to minimize cost and also save the time – a practical tool in modern times, an alternative to the conventional method.

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