CHAPTER VI

DISCUSSION AND CONCLUSION

This chapter discusses the traditional mobile inspection method used in the Ministry of Communication Transportation, Post and Construction (MCTPC) in Lao PDR along with the proposed method in order to establish the effectiveness of the computerized method. The chapter also discusses advantages and disadvantages of mobile inspection data entry system, followed by the conclusion of the present study.

6.1 Traditional Methods vs. Proposed Techniques

In the recent years, the traditional techniques for road inventory data collection in Laos always rely on pencil-and-paper method. Such technique is based on the data collected by using printout road network map, GPS unit. Inspectors would walk along the street and record properties and characteristics of road with pencil and paper. The information is later transferred to a GIS database in the office. This technique is relatively time consuming, inefficient, and difficult to update. Moreover, it is not sufficient for the large amount of information due to its substantial cost and time.

The proposed method for mobile inspection is considered to be more flexible and can adapt the database designed on the mobile device for field data collection. The large amount of collected data can be achieved in digital format in the field, reducing a significant amount of time previously required in transcription work in the office. In addition, in case the data is to be shared, distribution becomes easier and faster when information is in digital format. This method can also be used for road inventory assessment in the future.

6.2 Effectiveness of Mobile Inspection

According to experimental data collection using the proposed mobile inspection technique in Laos, it was found that this technique is efficient for field data acquisition. Equipped with PDA, ArcPad, and GIS system, data entry in the field can be directly linked to database. Coding error can be automatically checked in the field, which significantly helps eliminating obvious errors that may occur during data acquisition.

Regarding time and cost factors in the field data entry task on the national route 13N in Lao PDR, a total of four days were spent with approximately eight working hours per day for field data collection, excluding battery power recharge and data transfer to the laptop. During the field data collection, two Pocket PCs were used in a day since the maximum full charge of battery life for each is approximately 4 four hours. Data transferring to the laptop was done every evening of each day in order to prevent potential data lost that may happen after the data collection.

In this research, a set of equipment consisting of iPAQ hx 2415 series Pocket PC, GPS connection, SD card, digital camera, and ArcPad GIS software was implemented for field data collection. The implementation cost of mobile inspection is around 1,500 US dollars. When comparing to the traditional method, it can be seen that the cost of mobile inspection is more expensive. However, the cost of mobile inspection technique is only one-time purchase and benefit could be achieved once it has been consistently used for a certain amount of time.

6.3 Advantages and Disadvantages

6.3.1 Advantages

The primary advantage of using the proposed methodology for road inventory data collection is the reduction in the amount of time for data collection compared to tradition methods. Significant time savings for data collection were achieved when

compared to conventional collection. Other advantages include the potential for data sharing, transferring, distribution. Compatibility with GIS software is another advantage found in this method.. In addition, ArcPad software is capable of creating shape files from scratch or by importing fields from an existing shape file, allowing inspectors to import existing digital maps.

The advantages of this mobile inspection system can be summarized below:

- Allowing several people to digitize fixed length street centerline information at the same time

- Enabling attribute information on roadway features to be acquired at the same time when collecting roadway inventory and condition information

- Compatible with standard GIS software (ArcGIS)

- Accurate data due to GPS technology (typically within 5-15 meters)

6.3.2 Disadvantages

A primary disadvantage to PDA ArcPad inventory is its cost of implementation. In this study, the battery life of the PDA was also found to be a problem because the GPS receiver is connected with the PDA device directly. In reality, the PDA can be used in the field for approximately three to four hours. It is possible to overcome the battery problem by using devices with a swappable battery. After consulting with Ministry Communication Transportation Post and Construction (MCTPC) officials, it was suggested that the GPS should be self-powered or apply peripheral GPS receivers, which use their own energy source. Another problem found during the data collection was the unstable GPS connection.

The disadvantage of this mobile inspection system can be summarized below:

- High implementation cost of mobile inspection

- A minimum of two people required in the field to collect data (one person driving a van, while the other operating the PDA with GPS receiver)

- If the GPS signal is lost, or if there is user error in feature attribute collection, data must be recollected, requiring a secondary session in the field.

- The PDA battery power life decreases quickly because of the GPS receiver

6.4 Discussion

From the study results, it can be seen that the proposed mobile GIS system would be useful in surveying roadway inventory and condition. The method is proved to be of benefit in digital data entry and inspection purpose. The mobile GIS digital data entry technique allows GPS connection to support the position and navigation information at the specific location on the map. ArcPad mobile GIS also supports projection and datum conversion from the geographic GPS input mapping datum to the current map projection, and provides navigation capabilities as well as mapping functions, which help in controlling the quality of position in the field.

6.5 Summary and Future Works

This research presents a technique that can be used to substitute or be used in parallel with the traditional methods for field roadway inventory and condition data collection. The research focuses on data acquisition technique for field data entry using ArcPad mobile GIS system, which supports vector GIS map displays and

compatible with desktop GIS file format. The road network GIS map was used as a base map for data input by means of fixed length segment street centerline method. AcrPad mobile system with database adapted in the remote field location makes it easy to collect quality data by applying consistency checks. Although the digital data mapping seems to be a more complicated procedure than the pen-and-paper method, this technique can be considered an appropriate way to capture digital data in structure database, in which data can be retrieved in the future.

It should be noted that the present research is by no mean exhaustive. There are many rooms to improve the study in further work. For instance, a quantitative comparison in terms of time and cost between traditional methods and proposed methods could be examined in more details. In addition, mass implementation of the proposed method of data collection, which is not yet done in Laos, could provide as an interesting ground for future investigation. The proposed method, if conducted at the MCTPC level, should be carefully studied in terms of consistency with the existing database prior to implementation.