INTERNATIONAL TROPICAL TIMBER ORGANIZATION

ITTO

TECHNICAL REPORT

PROJECT TITLE:	ENHANCING FOREST LAW ENFORCEMENT IN PAPUA NEW GUINEA
REPORT TITLE:	TECHNICAL REPORT FOUR PILOT TESTING OF PNG LOG TRACKING SOFTWARE SYSTEM
AUTHOR:	DR. ROBERT TENNENT, SGS PNG LIMITED, c/o Price Waterhouse Coopers, 6th Floor Credit House, Cuthbertson Street, Port Moresby, Papua New Guinea

PROJECT NUMBER:	PD 449-07-REV 2
HOST GOVERNMENT:	GOVERNMENT OF PAPUA NEW GUINEA
EXECUTING AGENCY:	PNG FOREST AUTHORITY
PROJECT COORDINATOR:	TOM BUKON, NATIONAL FOREST SERVICE
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TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

FA	Forest Authority
FLEGT	Forest Law Enforcement, Governance and Trade
PDA	Personal Digital Assistant
PNG	Papua New Guinea
PNGFA	Papua New Guinea Forest Authority
SGS	Société Générale de Surveillance

SUMMARY

A pilot log tracking software system was developed and tested during the project. The software consisted of a combination of PDA data collection software, with over the air updating, a web based data entry portal combined with a web based reporting facility, and a backend data storage component.

The software was installed on PDA units purchased with project funds, and tested by the three major project stakeholders, PNG FA, Cloudy Bay Sustainable Development Ltd and Stettin Bay Lumber Company Limited. Training was carried out at the three sites the participants were located in. Additional training was carried out by SGS PNG Ltd with associated testing.

. This report contains details of the testing, conclusions made, and recommendations are made as to the further development of log tracking software for PNG

1. Introduction

Pilot software developed under the project PD 449-07-REV 2 was tested at two private companies' sites, as well as by SGS PNG Ltd and the PNG FA.

The two private companies were Cloudy Bay Sustainable Development Ltd and Stettin Bay Lumber Company Limited. Both companies were provided with training and PDA units for the testing. Project staff made site visits to assist in training and in trailing of the software and PDA units.

Further training was provided by SGS PNG Ltd to PNG FA staff, who carried out trial testing of the software and PDA units. SGS PNG Ltd carried out extensive trialing of all aspects of the software and PDA version of the software.

The report describes the testing of the software developed for the project and includes recommendations for any future stage two implementation of a software system.

2. Methodology

An internet based log tracking software system was developed jointly by project consultants employed by SGS PNG Ltd and Helveta Ltd. The software system was based on a set of technical specifications developed by the project through a series of interviews and field trips.

The technical specifications were developed in collaboration between PNG FA, SGS PNG ltd, and Helveta Ltd. Full details are contained in project document PNGFA Pilot Technical Specification v1.6 (Helveta Ltd, 2010).

The software developed was internet based, using web forms for data collection and reporting. The system provides for users to log into the system over the internet under one of several defined roles. These roles include:

- Log scaler
- Export clerk
- Forest Manager
- Harvesting Supervisor
- Log Yard Manager
- Saw Mill Manager
- Saw Mill Yard Manager
- SGS Export Inspector
- Database Administrator
- PNG FA Head Office Manager
- PNG FA Project Manager
- PNG FA Project Supervisor
- PNG FA Provincial Forest Officer
- PNG FA Supervisor

Each role has different menu items and access to different software functions. For example, a log scaler can only enter logs with their dimensions. Any changes to log data entered in the system must be made by another user with a higher role, such as a user who is a Forest Manager. Figure 1 below shows the menu screen for a forest manager, with access to most of the available menu items.

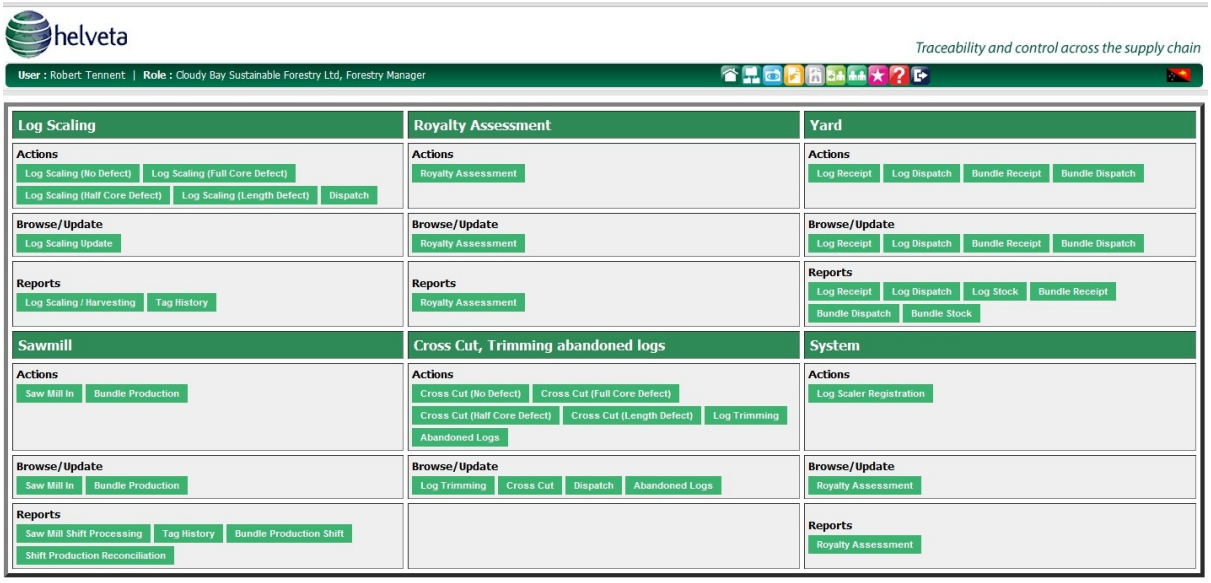


Figure 1 Forest manager menu screen

The software system can be used to enter log data, track log movements from forest to log storage facilities, to a saw mill, and into a log yard. Logs can then be tracked as they are converted to timber, and the bundles of timber produced can be collated in a saw mill yard.

The system allows for an individual log to be tracked through all stages of the logs journey from forest to either export or conversion to timber. The system also allows for PNG FA staff to calculate royalties and other charges allocated against the log or groups of logs. The system also interfaces with the SGS PNG FA log tracking system already in use by the PNG FA for tracking of export logs. The log tags placed on the logs can be tracked and SGS Inspectors can capture the log details from the log tracking software system.

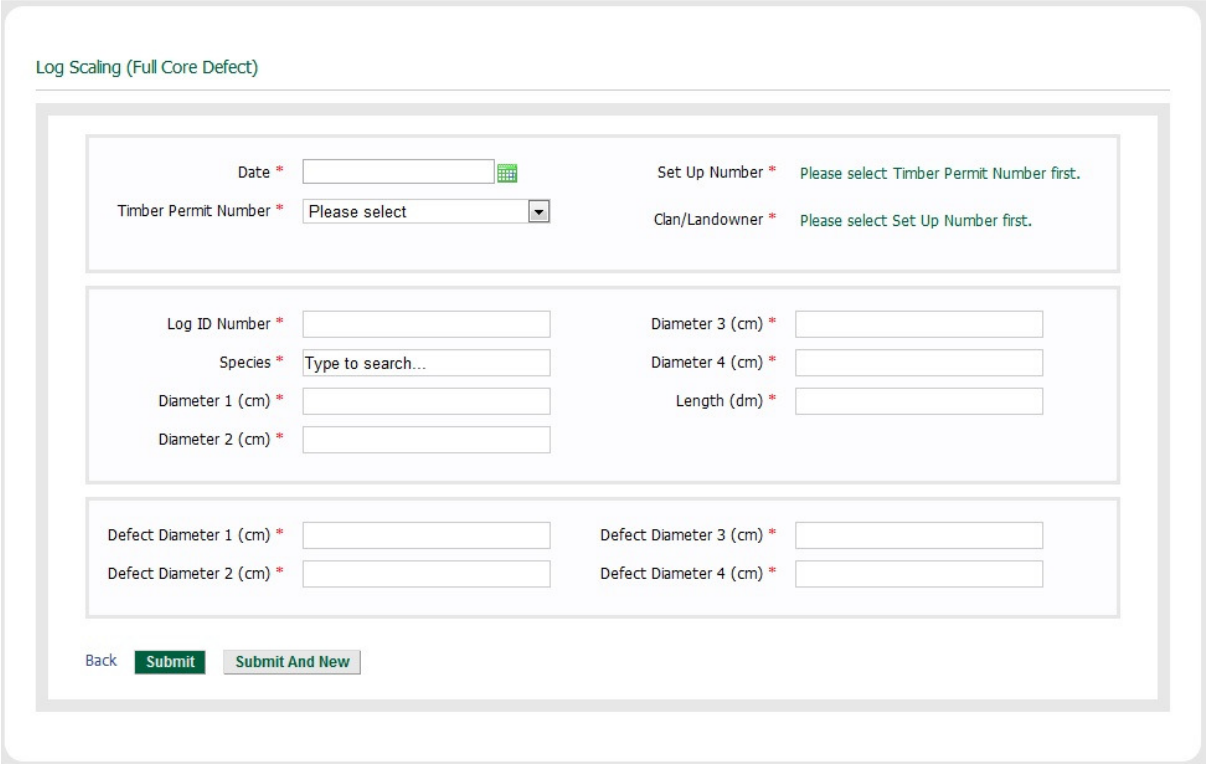


Figure 2 Log scaling data capture screen.

Figure 2 above shows the log scaling data capture screen which is used for data entry of log details.

The system also allows for the generation of reports on logs and groups of logs. A series of reports can be produced, depending on what role the user is allocated. Figure 3 below shows the selection screen for log browsing.

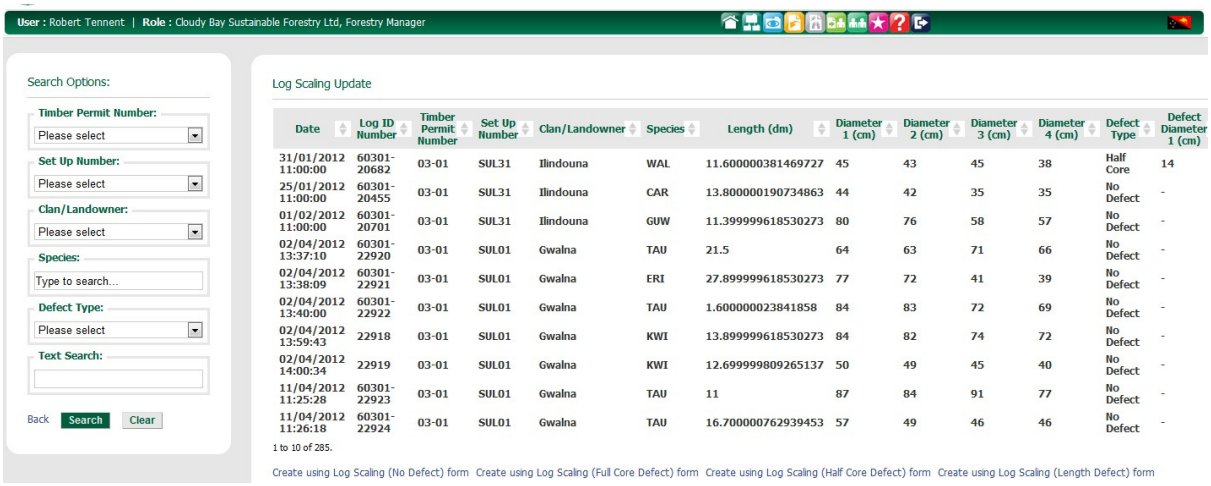
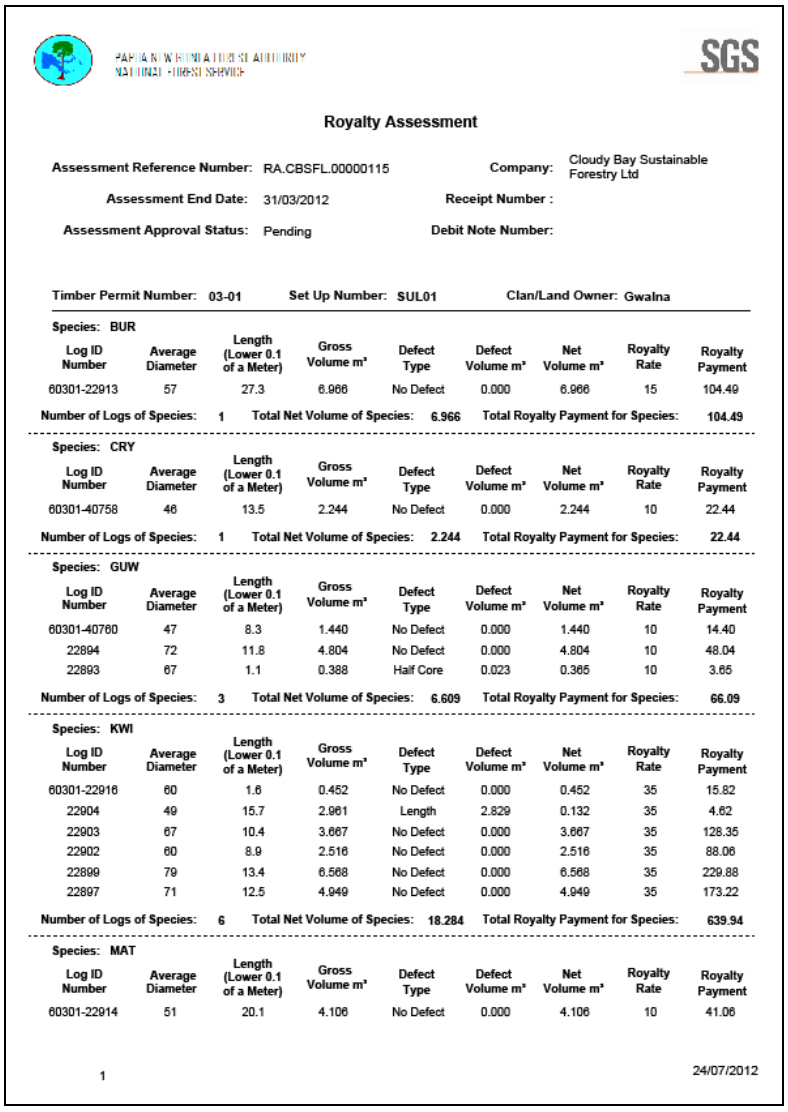


Figure 3 Log selection browser

Reports can be prepared on a variety of aspects of log tracking, such as the Royalty Assessment report shown in Figure 4 below.



PAPUA NEW GUINEA FOREST AUTHORITY
NATIONAL FOREST SERVICE

SGS

Royalty Assessment

Assessment Reference Number: RA.CBSFL.00000115 **Company:** Cloudy Bay Sustainable Forestry Ltd

Assessment End Date: 31/03/2012 **Receipt Number :**

Assessment Approval Status: Pending **Debit Note Number:**

Timber Permit Number: 03-01 **Set Up Number:** SUL01 **Clan/Land Owner:** Gwalna

Species: BUR

Log ID Number	Average Diameter	Length (Lower 0.1 of a Meter)	Gross Volume m³	Defect Type	Defect Volume m³	Net Volume m³	Royalty Rate	Royalty Payment
60301-22913	57	27.3	6.966	No Defect	0.000	6.966	15	104.49

Number of Logs of Species: 1 **Total Net Volume of Species:** 6.966 **Total Royalty Payment for Species:** 104.49

Species: CRY

Log ID Number	Average Diameter	Length (Lower 0.1 of a Meter)	Gross Volume m³	Defect Type	Defect Volume m³	Net Volume m³	Royalty Rate	Royalty Payment
60301-40758	46	13.5	2.244	No Defect	0.000	2.244	10	22.44

Number of Logs of Species: 1 **Total Net Volume of Species:** 2.244 **Total Royalty Payment for Species:** 22.44

Species: GUW

Log ID Number	Average Diameter	Length (Lower 0.1 of a Meter)	Gross Volume m³	Defect Type	Defect Volume m³	Net Volume m³	Royalty Rate	Royalty Payment
60301-40760	47	8.3	1.440	No Defect	0.000	1.440	10	14.40
22894	72	11.8	4.804	No Defect	0.000	4.804	10	48.04
22893	67	1.1	0.388	Half Core	0.023	0.365	10	3.65

Number of Logs of Species: 3 **Total Net Volume of Species:** 6.609 **Total Royalty Payment for Species:** 66.09

Species: KWI

Log ID Number	Average Diameter	Length (Lower 0.1 of a Meter)	Gross Volume m³	Defect Type	Defect Volume m³	Net Volume m³	Royalty Rate	Royalty Payment
60301-22916	60	1.6	0.452	No Defect	0.000	0.452	35	15.82
22904	49	15.7	2.961	Length	2.829	0.132	35	4.62
22903	67	10.4	3.667	No Defect	0.000	3.667	35	128.35
22902	60	8.9	2.516	No Defect	0.000	2.516	35	88.06
22899	79	13.4	6.568	No Defect	0.000	6.568	35	229.88
22897	71	12.5	4.949	No Defect	0.000	4.949	35	173.22

Number of Logs of Species: 6 **Total Net Volume of Species:** 18.284 **Total Royalty Payment for Species:** 639.94

Species: MAT

Log ID Number	Average Diameter	Length (Lower 0.1 of a Meter)	Gross Volume m³	Defect Type	Defect Volume m³	Net Volume m³	Royalty Rate	Royalty Payment
60301-22914	51	20.1	4.106	No Defect	0.000	4.106	10	41.06

1

24/07/2012

Figure 4 Royalty assessment report

A further feature of the log tracking system is the ability to collect log data using PDA units. The PDA software allows for log scaling information to be entered, with the log tag scanned, and also for the position of a log to be recorded. This allows logs to be tracked from the forest to a variety of intermediate points to the ultimate location.

The PDA units selected for the study were Motorola MC55 models. These units have bar code scanners which allow data to be scanned into the unit. They also have cell phone SIM cards, allowing the units to transmit and receive data while out of office, as well as wifi and network connection capacities. During the trial period the cell phone connection was used for testing purposes only. The majority of the pilot testing was conducted using a data cradle which connected to a computer located on an office network which had internet access.

In the office the PDAs were synchronised with the main database via the internet. This process transmitted data collected on the PDA to the database, and downloaded new data onto the PDAs. This enables any PDA unit to recognised log data collected by other PDA units, or entered via computer in the office.

Figure 5 shows a PDA in the combined charging and data interface cradle.

Figure 5 Motorola MC55 PDA in data cradle

Figure 6 shows an example of a PDA data entry screen.

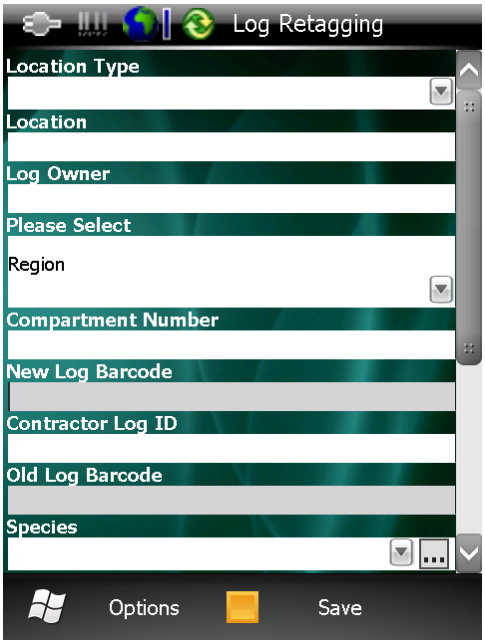


Figure 6 PDA data entry screen

During the PDA field testing a number of observations were made concerning the use of the software on mobile devices. These include the following:

- Care must be taken that the PDA units are synced (backed up) on a regular basis.
- The PDA units should be fully recharged before use in the field
- Bright sunlight can make PDA use difficult
- The PDA software should be simplified as far as possible to ensure field use is feasible
- Entertainment software such as music players and games should be removed from the PDA units to avoid misuse

A report of findings by Cloudy Bay Sustainable Logging Company is contained in **Error! Reference source not found.**. This report is presented as received, and does not necessarily reflect the option of all users of the PDA software, but provides feedback from field users.

3. Issues identified during testing

User feedback

User feedback on the use of the PDAs mostly concentrated on initial difficulties in using the instruments. Some field users had little experience with such devices, and some users were not computer literate. The use of a PDA requires an extra set of skills that some log scalers may not posses. Some log scalers were intimidated by the PDA units, in spite of having considerable experience as log scalers. Also some log scalers had had long careers in field logging, and were not accustomed to using relatively delicate instruments such as the PDAs. This caused some problems, in particular with users who were not experienced in the use of keyboards.

The field users seemed to fall into two categories, one category being those users who were enthusiastic about the use of new technology, and the other being those who were uncomfortable with the use of the PDA units. The former category of users would enquire on how to use the instruments, and look for ways to make the system work, whereas the second category of field users would tend to amplify problems that arose, and reject the use of the PDAs.

This is typical in cases of the introduction of computer systems for field use to replace existing paper-based systems. (c.f. Tennent, 1988). Some users feel threatened by the new system, and are concerned that their initial inability to use the system may threaten their jobs. Other users are more relaxed about the new technology. (In the long run the users who initially feel threatened often become strong advocates of the system.)

This user feedback serves to emphasise the importance of careful planning of any implementation of PDA units for field data collection. The training and adoption period must be anticipated.

Problems identified

The testing of the software system was difficult to carry out within the PNG FA due to a number of structural issues. The existing system is covered by legislation and regulation which is specific to the detail to be recorded and reported on. The PNG FA has well developed procedures in place for staff to follow in the issuing of licences and permits, which prohibits the use of systems outside the procedures being used formally. This meant that the PNG FA staff were legally restricted from testing the pilot system in the granting of royalty assessments or other functions of the pilot system.

The PNG FA staff contributed to the trialling of the pilot software through meetings and deliberations. Work pressure on maintaining the work flow of the existing system restricted the time available for staff to take part in hands-on trailing of the system. SGS PNG Ltd staff acted as surrogates for the PNG FA staff during the trialling of royalty assessment aspects of the software system.

PNG FA staff reported back that the trial system included the ability to examine a range of reporting options which were not available via the existing paper based system. They appreciated the additional reporting capabilities of the software system.

Issues to be resolved

Any future implementation of a nationwide PNG data collection system must resolve the issue of where the system is to reside, as well as take into consideration PNG's challenging geographic structure, which has resulted in a variation in internet access. Not all areas in PNG have access to fast reliable internet. The system trialled worked well within areas with good internet access, but could not be expected to work as well in areas with poor internet access.

The internet access issue will reflect the choice of implementation action for a future system. The trial system was based on servers in the United Kingdom, to enable repaid development of the software. However this amplified the internet access issue. A future PNG-wide system is most likely to be more successful if it is based on servers located in PNG. A network of such servers may be desirable in the long run.

The implementation of a PNG-wide system could possibly benefit from the adoption of a hybrid system, where PDAs are capable of direct transmission to a remote server, or use of a 'store and forward' process, where data were stored either on PDAs or on local PCs, for later forward to a combined database.

This would mean that not all PDAs or local PCs would contain a full set of data at all times. However, as forest operations are rarely time-critical, with lags between the various stages in a log's transport and final export, it would not normally be critical that the log data become available at the time the log data were required for preparation of Royalty Assessments or ultimate export inspection.

The system tested was developed in partnership with Helveta Limited, an UK company. Use of the system was depended on a user license granted by Helveta Ltd for the duration of the project. The project was timed to conclude in late 2012. However, funding interruptions meant that the project was on hiatus for several months during 2012. The funding interruptions meant that the payments due to Helveta Ltd could not be made. When payment was not forthcoming, Helveta Ltd terminated access to the system, which prevented a final round of testing and demonstration being carried out.

This highlights the vulnerability of any system which is dependent on the good will of a third party. In the pilot test Helveta Ltd withdrew access to the system. Any further system will need to consider software access, and not be in a position where any third party can unilaterally close the system down.

4. Conclusions

The software developed during the project provided a useful mechanism for the testing of the concept of the use of software for tracking of logs through the transport and processing stages. The software developed enabled feedback to be obtained from a wide range of users, from log scalers thorough PNG FA officials. The feedback obtained during the project has provided valuable details of what may be possible for development of an implementation system.

User feedback provided a firm conclusion that future systems should be controlled by PNG government representatives. This would most likely be the PNG FA or another body appointed by the Government of PNG. Having software hosted in another country provides communication problems given the limitations of internet connectivity in PNG. There are also issues with continued access to the software and limited options for future development.

A further issue is the commitment of those involved for the successful implementation of such a software system. During the pilot testing the two companies involved both showed a commitment to contributing feedback on the development of the system. However, ongoing work pressures at the two companies meant that there were limitations on the degree to which the companies could engage with the system. The conclusion reached is that any future system would require regulation or legislation to ensure that companies implemented the system.

A further finding is that testing a new system is a difficult and time consuming task. When an existing system is in place, those engaged in carrying out the functions of the new system are often not able to devote additional time to testing the new system. If a new system is put in place, both systems will be required to function for an overlapping period. This will require additional staff resources for the period in question.

The project was successful in demonstrating and pilot testing software for log tracking. Development of a future system will require funding and regulatory support.

5. Recomendations

- While the use of an off-shore development team was an advantage in the development of the trial system, any future system should be based in PNG to ensure software ownership issues are resolved.
- Any future software system should ensure that PNG FA has a right to use of any software in perpetuity, either by payment of licenses, or through access to the source code to permit the system to be ported to an alternative supplier.
- Introduction of the use of field PDA units should follow a phased development, with dual systems in place for a period of time, with the existing paper-based system operating alongside the PDA system.
- Field PDAs should be an optional element, with the implementation system allowing for either paper or PDA data capture at the initial data capture point. This will allow for the capital cost of PDAs to be avoided by implementers who wish to do so, and also allow for sites where PDA use may not be feasible
- Alternative data entry systems should be available, such as entry into Excel spreadsheets for later upload to a central database system.

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Tennent, R.B., 1988. A New Zealand data collection procedure for growth modeling. In: "Modeling trees, stands, and forests. Edit. J.W. Leech et al, Bulletin No. 5, School of Forestry, The University of Melbourne.

ANNEXES

Annex 1. Analysis of use of PDA from field testing company

Brief Report: PDA Trial Project
By: Steven Simaga
Company: CBSFL
Date: August 2, 2012

Introduction

1) CBFMA commenced capturing log data on 09th January 2012.

2) Objective of the pilot project was to track logs when it came out of the forest and when it was further processed into timber or finished products.

3) Quantity of captured logs scaled at the log landings was 3000 plus.

4) Quantity of captured logs at the receiving site which is the Bam sawmill log yard was 6000 plus.

Strengths

1) The advantage of using the PDA was no duplication of log tag numbers. Being that all tags were scanned.

2) Reduces/No errors when capturing with the PDA.

Weaknesses

1) Time consumption when the laser takes time to read bar code, when sunlight intensity maximizes the laser is ineffective.

2) Accidental/Unexpected deletion of the software, CIMobile2.

3) Foreign cards can be inserted into PDA.

4) Music/video windows accessories allows for possible flatness of the dry cell which in turn contributes to inconvenience.

5) Poses risk, when data capture climbs the jinker to collect data.

6) Synchronization is slow or fails to transfer data effectively occasionally.

7) The PDA slows down in capturing the data, due to low memory when used over time. Users have to wait few minutes longer after, to capture next log.

8) The PDA screen is touch screen so when carried inside pocket or waist bag it is prone to deletion of programs.

Opportunities

1) If the tracking system is to be accepted and enforced by PNGFA, then the PDA system should focus more on tracking logs that come out of the forest and then have the company's internal timber tracking system linked to it. This will reduce the hefty effort Helveta and PNGFA is trying to achieve at this one time.

Threats

1) Possible introduction of virus if foreign cards are inserted.

2) The PDAs lack plastic covers, so is prone to wet weather damage.

3) Not all logging/milling operations can have capital to have internet access when at a small scale, such will be wokabout/chainsaw milling. If the system is implemented then who is going to provide all accessories to have it enforced?

Discussions

1) Create a prompt message/deny access for the program, CIMobile2 or its internal programs to be deleted or altered.

2) The PDA screen should be modified to have a closing cover after use.

3) Consider Intermec PDA (source Australia - Timbersmart), Motorola device design is inconvenient.

4) The search browse should allow for key words/number(s) text input to do search for logs that belong to a particular harvest location.

5) Consult PNGFA to provide full updated list of species code to be automated in the system.

6) Clear plastics manufactured to size fit

7) Permission prompt command

8) Disable command.

9) Make it efficient by automated server detection

10) Such events will cause downtime

11) CBSFL now has its own data capturing system. To collect all data to expose to NFS is a cumbersome exercise. The program should focus more on the logs that come out of the set ups.

12) This project is more suitable for log export. For downstream procession it is better each company be responsible in electronically collecting its own information. And submitting it to NFS.

13) Narrow the scope of the project.

14) Narrow the objectives of the project. The process should be done by phases to ensure that the objectives are achieved.