

TREES INVENTORY SYSTEM BASED ON RFID AT FRIM

AINUL HAZMIN BIN A.HAMID

A project report submitted in partial fulfillment of the
Requirements for the award of the degree of
MSc. (Information Technology – Management)

Faculty of Computer Science and Information System
Universiti Teknologi Malaysia

APRIL 2009

I declare that this thesis entitled “*Trees Inventory System Based on Rfid at Frim*” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : Already signed at thesis declaration document
Name : AINUL HAZMIN BIN A.HAMID
Date : 10th JULY 2009

Dedicated to En Hamid Karim, Pn Aliah Hj Baba, Siti Fatimah Muhamad, Nafisatul Ilmi and the rest of the family. Not to forget namely En Wan Badlishah Wan Ismail (Kontena Nasional Berhad), En Johari Ismail, En Mohd Padzil Mohd Zain and En Zakaria Mansor (Proton Holdings Berhad), Pn Suzyla Ab.Latif and En Khairil Sabri (Perodua Manufacturing Sdn Bhd), En Syariff (Menersys) and last but not least to En Adnan Mohamad and Pn Nik Adlin Nik Mohamed Sukri (FRIM). Thank you very much for kind support and help.

ACKNOWLEDGEMENT

In order to finish the thesis report, I have met several people who are the professionals in the field and academician themselves. Their guidance and input have shown me the right direction in producing the outcome. First of all I would like to wish my appreciation to my supervisor, Assoc. Prof. Dr Harihodin Selamat for his idea, opinion and shared knowledge. Secondly to Dr Azizah Abd Rahman, who guides on the direction of research methodology write up. Without their assistance, I truly believe that it is impossible to accomplish the required report.

Secondly, I would like to thank to those professionals in the field for their valuable survey information. Namely En Wan Badlishah Wan Ismail (Kontena Nasional Berhad), En Johari Ismail, En Mohd Padzil Mohd Zain and En Zakaria Mansor (Proton Holdings Berhad), Pn Suzyla Ab. Latib and En Khairil Sabri (Perodua Manufacturing Sdn Bhd) and last but not least to En Adnan Mohamad and Pn Nik Adlin Nik Mohamed Sukri (FRIM).

I also would like to extend my appreciation to all my current colleagues and friends who have provided assistance in terms of opinion, advice and views. No to forget also to my family members who have been supportive since the day the survey activities were conducted.

ABSTRACT

RFID (Radio Frequency Identification) is a means of identifying a person or object using a radio frequency transmission. The technology can be used to identify, track, sort or detect a wide variety of objects. Communication takes place between a reader (interrogator) and a transponder (Silicon Chip connected to an antenna) often called a tag. Tags can either be active (powered by battery) or passive (powered by the reader field) and come in various forms including Smart cards, Tags, Labels, watches and even embedded in mobile phones. An inventory management system is an integrated package of software and hardware used in warehouse operations, and elsewhere, to monitor the quantity, location and status of inventory as well as the related shipping, receiving, picking and putaway processes. In common usage, the term may also refer to just the software components. The Forest Research Institute Malaysia (FRIM), is one of the leading institutions in tropical forestry research, both within the country and abroad. The institutions is a statutory body governed under Ministry of Natural Resources and Environment. The implementation of RFID in inventory management system is to assist the institution in keeping track of trees record at their place. Several analysis and problem statement are study thoroughly in order to come out with an application that will able solve several issues at FRIM. The outcome of this application project should reduce time for data gathering of trees and also reducing the cost of manpower.

ABSTRAK

RFID (Pengenalan Frekuensi Radio) adalah suatu cara mengenalpasti orang atau benda menggunakan transmisi frekuensi radio. Teknologi ini boleh digunakan untuk mengenalpasti dan mengesan sebarang objek. Komunikasi berfungsi dalam bentuk pengimbas dan 'transponder' juga dikenali sebagai tag. Tag RFID ini boleh didapati dalam bentuk aktif (digerakkan oleh bateri) atau pasif (digerakkan oleh medan pengimbas) dan dating dalam pelbagai bentuk seperti kad pintar, tag, label, jam tangan dan juga wujud dalam fungsi telefon bimbit. Sistem pengurusan inventori adalah pakej gabungan perisian dan perkakasan yang diaplikasi dalam operasi gudang dan sebagainya untuk mengawasi kuantiti, lokasi dan status inventori yang mana boleh dilibatkan dalam proses penghantaran, pengambilan di kargo. 'Forest Research Institute Malaysia (FRIM) adalah salah satu pusat penyelidikan hutan yang terulung samada di dalam atau di luar Negara. Institusi ini adalah badan kerajaan yang ditubuhkan di bawah Kementerian Sumber Asli dan Alam Sekitar. Perlaksanaan RFID di dalam system pengurusan inventori berupaya untuk menyelesaikan beberapa isu di FRIM. Hasil daripada projek aplikasi ini seharusnya mengurangkan masa untuk pengumpulan data-data pokok dan juga mengurangkan kos buruh.

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CHAPTER 1

PROJECT OVERVIEW

1.1 Introduction

RFID (Radio Frequency Identification) has seen its widespread use across countries in the world where its tremendous potentials and benefits has driven many parties to look forward in implementing the technology in the future. The enhanced capability in tracking goods data, fast-information retrieval, efficient inventory monitoring and management and accurate data updates in warehouse has seen it usage in warehouses, manufacturing, ports, libraries and ports to name a few. It will be a reality in years to come, for business players in Malaysia to truly appreciate and utilize the technology to its maximum capacity in delivering better return and outcome to them terms of business value and return on investment.

Some of the developments taking place in Malaysia with regards to the RFID application are, RFID chip-based visas containing personal details and thumbprint for

foreign workers to be implemented by Malaysian Immigration Department, e-plate chip at car plate numbers to be implemented its policy by Malaysia Road Transport Department to prevent car thieves and and Smart Shelf project by Telekom Research & Development Sdn Bhd for MMU library book inventory management.

The objective of the project is to study several case study by collecting some information at companies and institution in Malaysia such as Kontena Nasiona Bhd, Proton Holdings Bhd, Perodua Manufacturing Sdn Bhd and Forest Research Institute Malaysia (FRIM). The studies will guide on the current development pertaining to RFID implementation in inventory management, current issues, management aspect and business impact as a whole. Based on the data supplied, a RFID Inventory Management System prototype will be built as a conclusion to the surveys being made at those instituion/companies especially with regards to FRIM case study in order to assist them with their current problem.

1.2 Background of Problem

Eventhough RFID has many benefits which can be translated for business purposes, not many information on the application usage is known in Malaysia. From the prospect on RFID itself, we can relate it to other parties such as warehouses, ports, shopping complexes and manufacturers where the RFID will apply greatly and efficiently to deal with enormous inventory management data. Management perspective on this technology itself will provide better understanding and valuable information on the usefulness, issues and further exploration research on RFID as a management tool.

It will be interesting to get to know some of the parties being involved in the previous case study being conducted for this project 1 such as Kontena Nasional, Proton Holdings, Perodua Manufacturing Sdn Bhd and FRIM to learn about their experience, knowledge and issues pertaining to RFID in managing inventory. It is imperative to know

to what extend RFID has assisted them in their business operation and future aspiration for further development of RFID especially for FRIM case. Human aspects combined with management approach, business objective and vision together with technology help will be a crucial factor in deciding further exploration of RFID capability in many years to come.

1.3 Statement of Problem

- Among some of the issues being faced at FRIM at the moment is hardware problem such as obsolete PDA.
- RFID implementation issue and the trees where they will swallow the RFID tag as they grow.
- Database update which can be a problem if not followed up properly and working culture among staffs such as urgency non-reaction and accident management.
- FRIM hopes for a precised, simple and easy to use RFID system application and looking forward for further exploration on RFID for public and tourism usage.
- FRIM opines that from software point of view, related growth and behaviour of RFID must be further studied.
- In terms of hardware and software issues, both must be further explored as certain issue being faced such as data tracking distance must be addressed.

With statement of the problems being mentioned, the proposed To-Be system aims to address the problems.

1.4 Project Objective

Objectives of the Project:

- To study and analyze the application of RFID (Radio Frequency Identification) technology in FRIM to identify any issues and feedback for any possible system refinement.
- To design and develop an inventory management system for tracking and reporting purposes using RFID technology for FRIM .
- To develop organizational strategy for the implementation of RFID application at FRIM.

1.5 Scope

The scope of the project are:

- The study will discuss the issues pertaining to inventory management and how Inventory Management System application can be built to solve the problem at FRIM.
- The study analysis will be done at FRIM where actual data will be used.
- To redesign a trees database for FRIM.
- To develop a centralized portal for trees database where it can be easily viewed by FRIM researchers.
- To implement RFID technology management tool in tracking trees.

1.5.1 The Core Functionality

The functionality of proposed are as follows:

- A FRIM RFID system in inventory management which will function in capturing data from trees that are attached with RFID tags. RFID tags will keep the trees information when needed by the research officers and FRIM clients. The only different is that the inventory system will be made simpler based on the number of data needed.
- There will be some RFID tag and reader to be integrated with the inventory management system. These devices will capture some of trees data samples to be viewed in inventory management system.

1.5.2 Data

The data available in the system will consist of several real data which include tree types, species, scientific names and identities which are kept together. ID and profiles will also be used in the system.

1.5.3 Software/Hardware/Platform

Below are some of the technologies that will be used to develop the project:

- Software - VB.Net, Crystal Report
- Hardware – RFID sensors/reader, RFID tag
- Database – MS Access.

1.5.4 User

The users for this system are:

- FRIM research officers
- FRIM clients

1.5.5 Type of Testing

- Unit testing tests the minimal software component, or module. Each unit (basic component) of the software is tested to verify that the detailed design for the unit has been correctly implemented.
- Integration testing exposes defects in the interfaces and interaction between integrated components (modules). Progressively larger groups of tested software components corresponding to elements of the architectural design are integrated and tested until the software works as a whole.
- System testing tests an integrated system to verify that it meets its requirements.
- Acceptance testing can be conducted by the end-user, customer, or client to validate whether or not to accept the product. Acceptance testing may be performed after the testing and before the implementation phase.

1.6 Importance of Project

The development of the project would enable users to utilize the benefit of RFID in Inventory Management System such as:

- For FRIM it will help them on managing how trees information is derived, kept and used through the use of RFID in managing big and critical information such as collection of trees for research at FRIM.
- For FRIM's clients and researchers, the RFID application will enable them to conduct research assignment effectively, as they can easily gather and read information from trees.
- For the benefit of FRIM management and officer, the project will help them to manage and conduct research in forest and trees efficiently in terms of trees inventory monitoring and management.
- The project setup will also be a learning process to study in terms of building the right infrastructure, planning the cost-efficient and reliable system in terms of database setup and design, getting and matching with the right devices specifications, and also the opportunity to learn current advancement in RFID deployment and issues at hand especially at FRIM case study scenario. This will help Malaysia government to better manage and plan their expenditure allocation in other natural resources such as timber industry supervision, palm oil, rubber and biotechnology related industry.

1.7 Chapter Summary

The case study project would enable us to study and understand current developments taking place in Malaysia and at overseas in order to know the kind of potential application that can be developed, and also to appreciate the issues, challenges, and solution that RFID can offer in data management as a whole.

From the surveys being conducted at four premises recently, we have recognized some of the key issues and challenges facing the management people that have deployed the RFID in inventory management at their premises. Based on the information being gathered from the survey and major issues that must first be addressed prior to the system planning, it will guide us on developing practical and low-cost infrastructure setup to any party interested to use it someday in the future.

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