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KUTKM VEHICLE MAINTENANCE SYSTEM

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This report is submitted in partial fulfillment of the requirements for the Bachelor of Computer Science (Software Development)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA
2006

DECLARATION

I hereby declare that this project report entitled

KUTKM VEHICLE MAINTENANCE SYSTEM

Is written by me and is my own effort and that no part has been plagiarized without citations.

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SUPERVISOR : _____ DATE : 21/07/06

(MR. BURHANNUDIN BIN MOHD ABOOBAIDER)

DEDICATION

To my beloved parents, Mr. Badardin bin Jaafar and Mrs. Siti Taslimah binti Hj. Emran, for their nevertheless expression of love and full support…

To my supervisor, Mr. Burhannudin bin Mohd Aboobaider for making it all worthwhile…

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ABSTRACT

KUTKM Vehicle Maintenance System consist all the specific needs of the project. The objective of the project is to improve the services of KUTKM Vehicle Unit as the targeted organization and increase efficiencies. The scopes of the project are providing sophisticated functions which will help to improve and simplify the vehicles maintenance tasks to be done. Then, the purpose of development KVMS also was to introduce new approach within KUTKM through the consumption of sending a reminder using tele-message. Furthermore, the development of KVMS will also focus on doing the maintenance analysis which is divided into three sub-modules which are Preventive Maintenance, Corrective Maintenance, and Maintenance for Cost calculations. The methodology that will be use for this project is Object-oriented Analysis and Design (OOAD). Finally, the significances of the thesis are for fast updating in order to facilitate the system to alert for Preventive Maintenance and produce a summary and assumption base on MTBF formula during the analysis parts to support the targeted organization making decision.

ABSTRAK

Sistem Penyelenggaraan Kenderaan KUTKM mengandungi semua keperluan projek yang diperlukan. Objektif projek ini adalah untuk meningkatkan servis di dalam Unit Kenderaan KUTKM, sebagai organisasi sasaran dan juga menambah effisien. Skop pembangunan projek ini adalah bagi menyediakan fungsi-fungsi yang canggih yang dapat membantu kerja-kerja penyelenggaraan kenderaan dilakukan. Seterusnya, tujuan pembangunan *KVMS* juga adalah untuk memperkenalkan pendekatan baru di dalam KUTKM melalui pengaplikasian penghantaran peringatan menggunakan SMS. Di samping itu, pembangunan *KVMS* juga difokuskan terhadap melakukan analisis terhadap data-data penyelenggaraan yang dibahagikan kepada tiga submodul iaitu Penyelenggaraan pencegahan, Penyelenggaraan pembaikan, dan juga pengiraan kos bagi penyelenggaraan. Kaedah metodologi yang digunakan untuk projek ini ialah OOAD. Akhir sekali, kepentingan tesis ini adalah untuk kepantasan dalam pengemaskinian bagi mengaktifkan sistem untuk memberi amaran untuk Penyelenggaraan pencegahan dan mengeluarkan huraian berdasarkan formula *MTBf* semasa melakuakan analisis bagi menyokong organisasi sasaran dalam membuat keputusan.

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LIST OF ABBREVIATIONS

NO.	ABBREVIATION	NAME
1.	ERD	Entity Relationship Diagram
2.	KUTKM	Kolej Universiti Teknikal Kebangsaan Malaysia
3.	KVMS	KUTKM Vehicle Maintenance System
4.	LAN	Local Area Network
5.	OOA	Object Oriented Analysis
6.	OOD	Object Oriented Design
7.	OOAD	Object Oriented Analysis and Design
8.	MTBF	Mean Time Between Failure
9.	MTTF	Mean Time To Failure
10.	SMS	Short Message Service
11.	TAAF	Test Analyze and Fixed
12.	UML	Unified Modeling Language
13.	VB	Visual Basic

CHAPTER I

INTRODUCTION

1.1 Project Background

Kolej Universiti Teknikal Kebangsaan Malaysia (KUTKM) is the institute of education that applied hands-on application. KUTKM is subdivided into many departments to help the administrative side smoother their management flow and to establish their standard in education area. As the target unit, KUTKM Vehicle Unit seems to have potential for modifications via the assertion of a well-structured system. By the way, the scope of this system will just cover the vehicle's organizing area only and also contains with more matters arising to make the system more competent.

KUTKM Vehicle Maintenance System (KVMS) is developed to improve the organizing process for vehicles owned by KUTKM. The keyword vehicle here will cover all types of vehicles owned by KUTKM including buses, motorcycles, cars and etc.

The idea of developing this stand-alone system occurs because there is not yet any well-structured system applied for KUTKM vehicle's organizing. This system will use tele-message or well known as Short Message Service (SMS) approach as a reminder to the vehicle's driver besides sending a reminder via e-mail to the

administrator for any official purpose. The used of tele-message approach seems adorable and compatibility since hand phone is very popular nowadays and most of people afford to buy it. Next, this system will also have ability to do and produce high level statistic which is expected to be used in KUTKM to overview their maintenance activities. The statistic function will be supported by some maintenance reliability formula that will help the system to offer more reliable result. Furthermore, this system is not only rely on its ability to handle both functions, but will also provided more useful functions that will make KUTKM Vehicle Maintenance System run with more efficiently.

Lastly, the purposes of it used were to introducing new approaching system, make the vehicle's maintenance well organized with more efficiencies, reliability, and increase productivity.

1.2 Problem Statement

Nowadays, the used of tele-message or SMS seems very popular to the nationals. SMS is also applicable on many conditions and environments. Applying SMS approach is also seems to simplify the jobs or tasks needed to run vehicle's maintenance or organizing.

Currently, there is no well-structured system used within the Vehicle Unit of KUTKM to properly manage the vehicle's maintenance process. All the vehicle's maintenance jobs were fully relied to the individual or driver who is responsible to the vehicle. And it seems to be complicated for the major maintenance which were held base on schedule or by time. For example, a driver of a bus was responsible to know when to change the black oil which is done every 5000 or 10000 kilometres or within one or two years.

Next, the vehicle's maintenance processes are done manually. Driver needs to fulfil some forms and wait for the producing of the permission letter before a vehicle can be send to the workshop for maintenance duty. This means, the processes need to be run obeyed the fixed procedure which are wasting time. Therefore, there might be a vehicle is not applicable to be used at current time and become worse if it was scheduled for a journey.

From the interview that conducted with KUTKM Vehicles Unit Engineer, Mr Ainuddin bin Abu Kassim, he mentioned that the problem that also existed is lack of man power within the centre of the maintenance flow. This means, the vehicle need to go through five phases before it can be send for maintenance. The processes maybe stuck at the centre of the phases, such as at second phase, third, and fourth or maybe at fifth phase because of no employee working at particular time.

Therefore, the development of KUTKM Vehicle Maintenance System are build to cover all the problem that has been stated besides introducing more efficient functions.

1.3 Objectives

The developing of this system basically is to achieve some goals or objectives. The objectives for this project are:

i. To develop computerized system for KUTKM Vehicles Unit. The computerized system that will be developed will focus specifically on maintenance. This objective is set to be achieve because to reduce the used of man power and simplify the tasks needed for a maintenance to be done.

ii. To build alert system for maintenance of the KUTKM vehicles. This development system will alert via the sending of tele-message (SMS) and email as reminder to the driver and administrator. This objective applied to avoid the delay of preventive maintenance to be done.

iii. To simplify costs calculation. This objective is to simplify the costs calculation process and easier the vehicles maintenance observation process to be done. This objective is also expected to support future budget consideration for maintenance.

iv. To simplify the observation process. The development system will also have ability to generate a report through produce charts and graphs to easier Vehicles Unit to make an observation process on the vehicles that has been distribute for the used of other department under KUTKM.

v. To provide a secure staff management. This objective will be performing within the system by using the popular log in and password concept. This objective is applied to obey the system integrity.

vi. To provide ability on accessing information in ways that support strategic decision-making. This system will be performing by providing an assumption and suggestion for the statistics that has been produced. This will help the organization for future planning and making preparation for next features.

1.4 Scopes

As has been mentioned, KUTKM Vehicle Maintenance System is a stand-alone system. The developing of this system is base on some scopes. The scopes that are being listed below are getting from the observation and evaluation that have been made to the expected user and organization, KUTKM Vehicles Unit. The scopes are:

i. Alert via SMS and email. The system will have ability to alert via sending SMS to the driver and e-mail to the administrator as a reminder for major maintenance. This scope will require the driver to have a hand phone as he/she will receive a reminder through it.

ii. Stand-Alone system. This system will only be using under KUTKM LAN connection. This means, user outside the network connection cannot reach to the system.

iii. User categorization. The system will also provide with the functions to authorize user for the concern of data security. This task will be done during the log in process. As the result, only authorized users are allowed to access within the system.

iv. Vehicles maintenance analysis. The development system also has ability to generate a statistic. This scope also contains calculations that involve a maintenance reliability formula that needed and related with vehicles maintenance analysis.

v. Costs Calculation. KUTKM Vehicle Maintenance System will also providing with a function to calculate cost of the maintenance to help the organization for its future planning.

1.5 Project Significance

KUTKM Vehicle Maintenance System is develop to improve the productivity and efficiencies of KUTKM vehicle's organizing process. Actually, the target organization for this system is KUTKM Vehicle's Unit and the target user who seems to get the benefit from this development system are the drivers as they can get a

reminder for preventive maintenance for the vehicle that responsible to them through mobile phone, and the administrator, person who will be managing the system soon.

Basically, the benefit of this system is to simplify the process of organizing the vehicles owned by KUTKM. This is because, for the preventive maintenance such as changing the bus black oil, a reminder will set within the system and it will alert when the distance or kilometres of the bus reach 4000 to 4500 miles or in terms of every 6 months. Generally, the maintenance module will be divided into three main sub-modules which are Preventive Maintenance, Corrective Maintenance and Cost Calculations.

Next, other benefit or specialty this development system can contribute is easier the observation process for overall and specific maintenance that have been done. This is because the system will have ability to handle high level analysis and produce the result in the form of graphs or charts. As example, the system can calculate an average for cost that has been spent for each type of vehicle and after that, user will have many options in case to see this cost analysis more deeply whether to see the details, do a comparison and further more.

Lastly, base on its significant and the scopes that has been stated, KUTKM Vehicle Maintenance System seems to be an intelligence and educated system and seems very suite to be apply at KUTKM Vehicles Unit besides helping on improving its service.

1.6 Expected Output

KUTKM Vehicle Maintenance System platform is to be develop using Microsoft Visual Basic 6.0 software and Microsoft Access 2003 as its database. Generally, the

expected output of the system will be explained by divide into two major parts which are Functions and Data Collecting/Input and Output.

1.6.1 Functions

Basically, this system is expected to apply many functions. The expected functions to be applied are:

i. Calculation function. This function will apply twice during the costs calculation process and the analysis/generate report process. The calculation process will apply the used of some reliable formula to produce more sharpen and logic result.

ii. Alert function. Next, this function will apply the used of tele-message (SMS) and email. The SMS approach will just apply to send a reminder to the driver while the email approach is sent to the administrator.

iii. Authorization function. This function will be implementing during the login process which only authorized user will be granted to access. The system will trace or determine it through username and password that entered by user. The username for this development system is the user's matrix card number.

iv. Generate Analysis function. This function is applied to produce crystal report to shown the result of the maintenance that has been made. This function also provides a summary report and assumption base on the graphs or charts to support the decision making for the Vehicles Unit, the targeted organization.

v. Manage Stock Lists function. This function applied to help the workshop of the Vehicles Unit to manage their stock lists. This function will also contain alert function to remind about the stocks that need to be write-off.

1.6.2 Data Collecting/Input

As has been mentioned, this development system will just focus on vehicles maintenance only. However, the data collecting or input of the system will contains the data such as vehicle details, trip details, stock details, user details, maintenance details, and even the client or driver details. Examples for data collecting showed on tables below.

i. Vehicles Details

Table 1.1: Examples data for Vehicles Details

Type of vehicle	Bus
Registration Number	MAN7876
Seats	40 seats
Engine Oil	FW-100
Tyres	Michelin

ii. Stock Lists Details

Table 1.2: Examples data for Stock Lists Details

Spare Part	Tyres
Model	Michelin 100
Purchase date	12/09/2003
Expected write-off date	12/09/2004
Supplier	Seong Seng Tyres

iii. User Details

Table 1.3: Examples data for User Details

Name	Ahmad Shukri
IC Number	820109-09-5089
Department	Vehicles Department
Username	B030210194
Password	1234

iv. Client/Driver Details

Table 1.4: Examples data for Client/Driver Details

Name	Syed Izham bin Syed Azmi
Department	Security Unit
Responsible vehicle	Motorcycle (kriss)
Registration Number	MAN1090
Mobile Number	019-6745670