

i-Traktor: Ploughing Incentive Management System for Malaysian Paddy Farmers

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Abstract— This paper describes a computerised system to manage the information of ploughing incentive receivers. The ploughing incentive is allocated billions of ringgit by the Malaysian government and distributed via agencies such as Muda Agricultural Development Authority (MADA) and its mechanism which are the district farmers association or Pertubuhan Peladang Kawasan (PPK). MADA would disburse payment of the incentive directly to registered tractor owners based on the claims and reports furnished by PPKs. Requirement of the system are gathered from an agency in Sanglang, Kedah through document analysis and interviews. The objective of the system is to reduce issues of late payment, redundant payments, omission, and long preparation rate of claim reports.

Keywords—e-government; agriculture information system; ploughing incentive; information management system

I. INTRODUCTION

A computerized system that manages ploughing incentives for paddy farmers is an effort to contribute towards establishing e-government in Malaysia. E-government is one of the flagships under the Multimedia Super Corridor (MSC) which aims to transform administrative process and service delivery through the use of ICT. In 2008, Malaysia was ranked 34th in the world in terms of e-government readiness with an index of 0.6063 [United Nations, 2008]. This is considered a good placing out of 192 member states assessed in the United Nations' survey. However, not much focus has been given to the agricultural sector yet, particularly in the management of incentives or subsidy.

The ploughing incentive, also known as tractor incentive, was introduced in the Ninth Malaysian Plan (RMK9) by the Malaysian Government, along with several other incentives under the paddy production incentive scheme, to help achieve rice self-sufficiency level (SSL) of 90% and also increase the income of paddy growers. Under the scheme, RM100.00 will be given for each hectare as land preparation or ploughing incentive (Lembaga Pertubuhan Peladang, 2008).

The Ministry of Agriculture and Agro-based Industry (MoA) and its agencies hold the responsibility of ensuring that the incentives are given accordingly and that the objective of increasing farmers' income is accomplished. Their duties can be explained as in Fig. 1. At the top of the line, the MoA as the policy-maker endorses annual allocations and coordinates the activities of the agencies involved. Next in line are the agricultural development agencies (ADA) such as Lembaga Pertubuhan Peladang (LPP), Muda Agricultural Development Authority (MADA), Kemubu Agricultural Development Authority (KADA) and Sarawak Agriculture Department. These agencies coordinate the distribution of the ploughing incentives through Pertubuhan Peladang Kawasan (PPK) or District Farmers Organization. These PPKs are the actual implementing agents which ensure that the incentives are received by farmers.

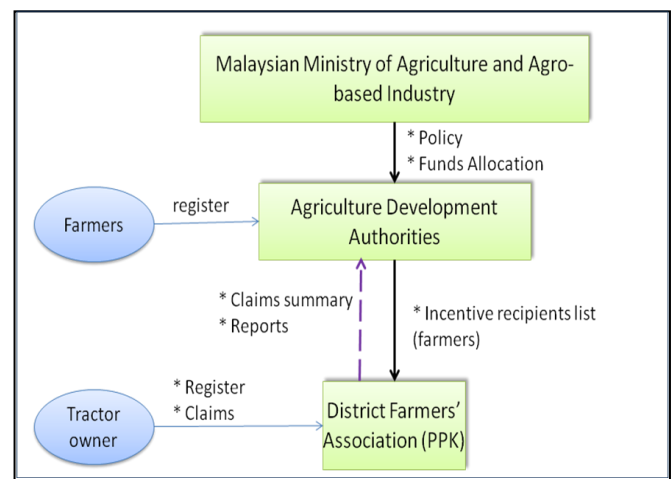


Fig. 1. Parties involved in implementing the ploughing incentive

To receive the incentive, farmers and tractor owners must be registered with the respective agencies in their geographical locations. Eligible farmers would be given coupons for each of their land plots that are entitled to receive the incentive. Farmers will not receive any money per se; they must hire

ploughing services from registered tractor owners according to their entitlement. In practice, the ploughing work is assigned by the PPK itself, distributed among available tractor owners, ensuring that the ploughing works are accomplished in a timely manner. After completing the work, tractor owners submit their incentive claims to PPK. PPKs make visits to the field site and certify that the lands are actually ploughed before endorsing the claim, and prepare claim reports which are submitted to the respective ADAs. Payments are made directly to the tractor owners by ADAs.

PPKs are required to prepare three types of claim reports, known as Form 4, Form 5a and Form 5b. Form 4 is generated for each tractor service provider, and lists the field plots that it has worked on. Form 5a is a summary report that lists all tractor service providers and their work. Form 5b is another summary report that shows the amount payable to each tractor providers and the overall sum. Preparing the reports requires extensive work since there are more than four thousand incentive recipients in one particular PPK. There are possibilities of redundant registrations and omission, untracked eligibility status changes, miscalculation of claims and work list. All these may affect the accuracy of incentive claims, which involves millions of ringgits in government funds. Besides that, the amount of time involved in preparing and verifying the claim reports may result in late payment to the tractor provider. Hence, a computerized information system is definitely called for to promote better management of the incentive and good governance in general.

II. RELATED WORKS IN AGRICULTURAL INFORMATION SYSTEM

There are several information systems that serve the agricultural sector, albeit rather limited. The Agricultural Information Application System (SAMP) and Agro-investment Application and Information System (SIAPP) are two examples in Malaysia while the Kenyan Agricultural Knowledge and Information System (AKIS) and the Indian Agriculture Information System Network Project (AGRISNET) feature examples from other regions of the world.

A. Agricultural Information Application System (SAMP)

Sistem Aplikasi Maklumat Pertanian (SAMP) or the Agricultural Information Application System is developed by the Malaysian MoA to assist in monitoring the status of national agriculture from time to time. It consists of five applications namely the Agricultural Trading Information System (TRADE), Supply-Demand Virtual Information System (SDVI), Fishery Information Network System (SIRIP), LKIM Ikan Online and Sarawak Agriculture Information System (ASIS). SAMP was initiated in June 2007 and completed in September 2008.

B. Agro-investment Application and Information System (SIAPP)

Agro-investment Application System or Sistem Informasi dan Aplikasi Pelaburan Pertanian (SIAPP) is managed by the Division of Investment Promotion and MoA to manage applications of tax incentives in the agro-food sector by eligible individuals and companies. The online application system was fully operational in 2010.

C. Kenyan Agricultural Knowledge and Information System (AKIS)

The Kenyan Agricultural Knowledge and Information System is a project of the Kenyan government to govern knowledge and skills in the agricultural sector better. It aims to be a repository of all resources pertaining to agriculture, including technical and operational knowledge such as how to manage late blight in potatoes, where to get certified seed, the most appropriate varieties for a given location, housing information and management of livestock. Field research was conducted in four districts of Kenya, including high-potential and pastoral areas, to document and assess the significance of different actors and organizations as potential uptake/dissemination pathways for agricultural technologies, and to consider ways to improve the performance of the knowledge and information systems in the districts. Databases of the organizations, institutions and actors involved in agriculture in the four districts were compiled, and a series of participatory and rapid appraisal exercises were carried out with people concerned with agriculture in selected sub-locations and divisions within each district.

D. Indian Agriculture Information System Network Project (AGRISNET)

The Indian Department of Agriculture and Cooperation (DAC) worked towards establishing a system that includes the development of databases and information systems for decision support for evaluation, monitoring and policy formulation. AGRISNET is one of the component under the National e-Governance Plan of Government of India which intends to promote agricultural informatics & communications. Its objective is to create a sustainable data bank of all agricultural inputs in the State of West Bengal containing entries for all relevant information pertaining to agriculture and its related activities and enable all relevant parties to access the information through a secure network. Currently, there are six citizen-centric applications have been implemented under this project, which are the Fertiliser Control and Management System, Certificate and Quality Control of Integrated Seed Management Information System, Project Monitoring System, Generation of Soil Health Card, Information System on Plant Protection & Quality Control of Pesticides and Weather Watch Information System. A portal for agriculture and allied sectors is also developed under the project.

III. METHODOLOGY

This project adapts the corporate software project development methodology (Lecky-Thompson, 2005) as the software development methodology which covers the whole process from gathering requirement up to delivery to the client. As this project focuses on the requirement model, it went through Proposal Phase, Planning Phase, Execution Phase and Validation Phase.

During proposal phase, the idea for this system was proposed after a few discussions with the stakeholder, namely the PPK personnel. The general requirement of the system is put together and possible constraints were identified. One of the constraints was that the farmers' information needed to be extracted from a spreadsheet document given by the headquarters.

In planning phase, requirements gathering are done by analysing existing documents and interviews with the corresponding person-in-charge in the PPK. The documents examined are manual of procedures, coupons, registration forms, list of recipient names and reports. The gathered information are then modelled using the object-oriented approach, namely use case diagrams to portray the association of respective stakeholders and sequence diagrams to show the flow of process.

The execution and validation phase are done a few times, usually overlapping with one another. The system components and features were implemented using designated programming language and tools. The user requirement was validated using a prototype based on this requirement model. Test scripts were provided to guide the users to test the system as complete as possible. From the user feedbacks, modification and adjustments were done until the final product is satisfactory.

IV. RESULTS AND FINDINGS

Listed in Table I are the functional requirements of the ploughing incentive information system. In the priority column, the following short hands are used:

M – Mandatory requirements

D – Desirable requirements

TABLE I. USER REQUIREMENT LIST OF PLOUGHING INCENTIVE INFORMATION SYSTEM

No.	Requirement Description	Priority
	Login	
1.	Users can login	M
2.	Users can cancel login	M
	Manage system users	

No.	Requirement Description	Priority
3.	Administrators can add users.	D
4.	Administrators can delete users.	D
5.	Administrators can reset user password.	D
	Manage company's profile	
6.	Administrator can view company's particulars.	M
7.	Administrator can edit company's particulars.	M
	Manage tractor providers	
8.	Users can add tractor provider	M
9.	Users can delete tractor provider	M
10.	Users can edit tractor provider	M
	View list of farmers	
11.	Users can view list of farmers.	M
	Assign ploughing work	
12.	Clerks can assign work to tractors	M
13.	Clerks can delete work assignments	M
	View reports	
14.	Users can view details of work by each tractor provider (Form 4)	M
15.	Users can view summary of work for each tractor provider (Form 5a)	M
16.	Users can view summary of work for all tractor providers (Form 5b)	M
	Logout	
17.	User can logout	M

The use case diagram in Fig. 2 represents the overview of the proposed system. In general, there are two actors and eight use cases involved.

A. Actors

Several potential actors were identified during the first requirement analysis, namely the system administrator, the manager, the clerk, the farmer and the tractor owner (which provides ploughing services). However, after several reviews and discussion with the PPK, it was decided that only two actors are really using the system, which are the system administrator and the clerk.

The system administrator is the person in-charge of the system. He or she is mainly responsible for the upkeep of the company's profile such as company's name and contact details, name of the manager, and also manages the system users. Although not his main responsibility, the system administrator should also be able to manage tractor providers' details, assign ploughing work, and view the reports.

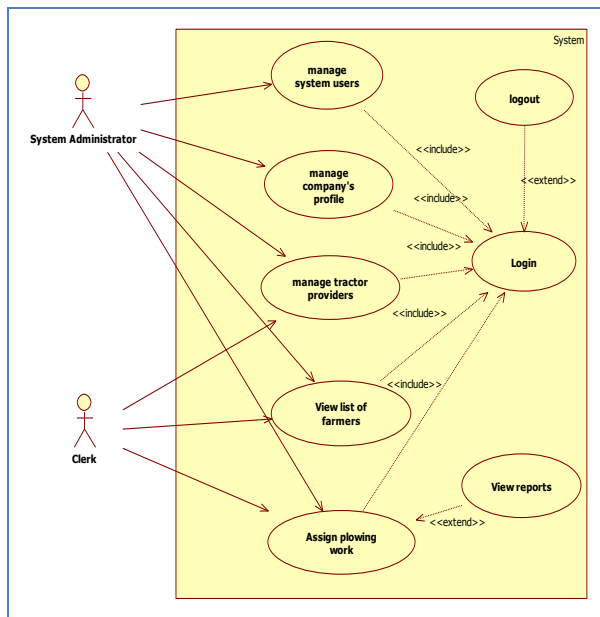


Fig. 2. Use case diagram of the ploughing incentive information system

The clerk owns fewer rights in terms of the functions that he can do. A clerk is the person who manages the tractor providers' details, assigns ploughing work and views the reports. The details are obtained from the forms available.

V. SCREENSHOTS OF SYSTEM INTERFACE

The system provides a login page for access control. Verified users will be brought to the main page as in Fig. 3.



Fig. 3. Main page

Registering tractor providers will take the user to a form such as depicted in Fig. 4, where the user is prompted to enter the details of the tractor owner which are (a) owner's name, (b) owner's identity card number, (c) tractor number, (d) bank name, (e) bank account number and (f) registration number. The 'save' or *simpan* button will be dimmed until the owner's name and tractor number is entered. To cancel the new registration, the user simply clicks on the exit button or *keluar*.



Fig. 4. Registering new tractor provider

When assigning a ploughing work, the system will display a list of registered tractor owners which are available for choosing, as in Fig. 5. From the list, users can opt to view the owner's details by double-clicking on an owner's record or selecting the owner and click '*Info Pemilik*' button. Either way, the details of that particular tractor owner will be shown such as in figure Fig. 6. Alternatively, the user may also select the tractor owner and delete it by clicking the delete button (*Padam Pemilik*). The system will ask for confirmation such as in Fig. 7.



Fig. 5. List of registered tractor owners

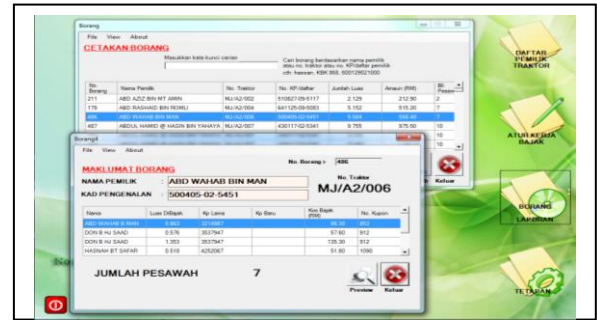


Fig. 8. An example of Form 4 showing the work assignment of a tractor owner

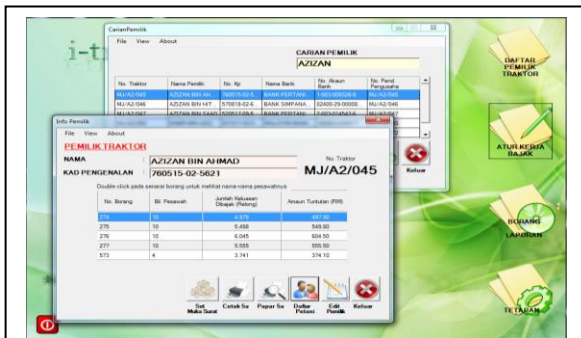


Fig. 6. Details of a tractor owner



Fig. 7. Deleting a tractor owner

Fig. 8 shows an example of information in Form 4 which is the work assigned to a particular tractor owner. The printed version of Form 4 is depicted in Fig. 9. An instance of Form 5a or the list of all work assignment of a tractor owner can be viewed in Fig. 10 and the printed version in Fig. 11. The summary of work by all tractor owners (Form 5b) is shown in Fig. 12 and Fig. 13.

**PENYATA TUNTUTAN PEMBAYARAN
PEKERJAAN HEMBAWA SAWAH
SKIM INSentif PEMBAYARAN KEPADA PESAWAH**

PPK: **MUSIM 2** TAHUN: **2011**

BAYARANUPAH PEKERJAANPEMBAJAKAN

Nama Pemilik/Jentera/Syarikat: **ABD VHAAB BIN MAN**
No. Kp/Center/Syarikat: **500408-02-5405**
Nama Bank: **5-00-0033-000007798**
No. Pendaftaran Pengusaha Traktor: **BANK PERTANIAN MALAYSIA**
NO/A2/006

Bil.	No. Pendaftaran PPK	Nama Pesawat	Lusa Sawah	Amalan Turutan (RM)
1.	00833	ABD VHAAB B MAN	0.883	88.30
2.	00912	DON B H3 SAAD	0.376	37.60
3.	00912	DON B H3 SAAD	1.393	139.30
4.	01090	HASINAH BT SARAF	0.318	31.80
5.	01090	HASINAH BT SARAF	0.376	37.60
6.	01090	HASINAH BT SARAF	1.324	132.40
7.	01090	HASINAH BT SARAF	0.374	37.40
JUMLAH			5.584	558.40

Dibancakan oleh: _____ (Tandatangan Pemilik/Jentera Pembajak)

Dibancakan oleh: _____ (Tandatangan Pengurus Besar PPK)

Nama: **HANISAH BUDIN**

Jawatan: **PENGURUS KAWASAN**

Fig. 9. Printed version of Form 4

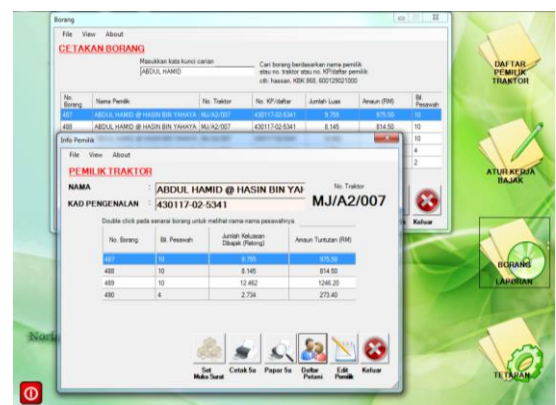


Fig. 10. An example of Form 5a listing all work assignment of a tractor owner

No.	No. Traktor	Nama Pemilik	No. Daftar	Nama Bank	No. Akaun Bank	Jumlah Luan Sewak (RM)	Jumlah Tuntutan (RM)
1.	ABDUL RAHMAN BIN HANIFFA	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
2.	ABDUL RAHMAN BIN HANIFFA	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
3.	ABDUL RAHMAN BIN HANIFFA	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
4.	ABDUL RAHMAN BIN HANIFFA	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
5.	ABDUL RAHMAN BIN HANIFFA	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
Jumlah						25.760	25.760.00

Fig. 11. Printed version of Form 5a

No.	No. Traktor	Nama Pemilik	No. Daftar	Nama Bank	No. Akaun Bank	Jumlah Luan Sewak (RM)	Jumlah Tuntutan (RM)
1.	MUAJ002	ABD ADZ BIN MY AMIN	61007-02-01	BANK PER.	1000310000	5.152	515.2
2.	MUAJ004	ABD RASHAD BIN ROMLI	61102-02-01	BANK PER.	1000310000	5.152	515.2
3.	MUAJ006	ABD WAHAB BIN MAN	50005-02-04	BANK PER.	100-0031-00	5.584	558.4
4.	MUAJ007	ABDUL HAMID @ HASIN	430177-02-03	BANK ISLAM	02-039-02-00	33.096	3309.9999
5.	MUAJ008	ABDUL RAHMAN BIN DA	61102-02-01	BANK SIM	15-002000-0	1.00000000	100.0
6.	MUAJ010	ABDUL RAHMAN BIN DO	55009-02-06	BANK SIM	02000-29-001	17.955	1795.4999
7.	MUAJ011	ABDULLAH BIN BAKAR	55016-02-02	BANK SIM	02104-29-001	13.61000000	1361.0000
8.	MUAJ013	ABDIN BIN MAVISOR	43006-02-02	MALAYAN	1500904006	1.525	152.5

Fig. 12. Summary of work done by all tractor owners (Form 5b)

No.	No. Traktor	Nama Pemilik	No. Daftar	Nama Bank	No. Akaun Bank	Jumlah Luan Sewak (RM)	Jumlah Tuntutan (RM)
1.	ABD ADZ BIN MY AMIN	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
2.	ABD RASHAD BIN ROMLI	61102-02-01	BANK PER.	1000310000	5.152	515.2	515.20
3.	ABD WAHAB BIN MAN	50005-02-04	BANK PER.	100-0031-00	5.584	558.4	558.40
4.	ABDUL HAMID @ HASIN	430177-02-03	BANK ISLAM	02-039-02-00	33.096	3309.9999	3309.9999
5.	ABDUL RAHMAN BIN DA	61102-02-01	BANK SIM	15-002000-0	1.00000000	100.0	100.00
6.	ABDUL RAHMAN BIN DO	55009-02-06	BANK SIM	02000-29-001	17.955	1795.4999	1795.4999
7.	ABDULLAH BIN BAKAR	55016-02-02	BANK SIM	02104-29-001	13.61000000	1361.0000	1361.0000
8.	ABDIN BIN MAVISOR	43006-02-02	MALAYAN	1500904006	1.525	152.5	152.50

Fig. 13. Printed version of Form 5b

VI. CONCLUSION AND FUTURE WORK

Since there is currently limited information systems that exist in Malaysian agricultural sector, this project will contribute to the body of knowledge in the said area. This system helps in managing information related to subsidy or incentive. With good design, the government would be able to provide more efficient services to the mass public.

This project may be seen as an initial step in developing a functional system. Since ploughing incentive is actually one part of three other incentives provided by the government to paddy farmers, it would a good effort to widen the scope of this system to accommodate the other incentives.

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