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FarmManager: an Android application for the management of small farms

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Abstract

Smart phone technology creates new opportunities for farm management applications in small farms. Farmers working on small farms are now able with a low cost smart phone and the specialized software (in our case FarmManager) to obtain facilities that couldn’t have on their hands before. The use of the FarmManager software in a smart phone can overleap the high difficulties of farm management requirements which were stand as obstacle for many years so far. Tasks such as field definition, task operations, lists and reports and all farming use data can be submitted and carried on together in a smart phone at any farm working condition. In this paper we present the FarmManager which is an Android smart phone application and how it creates the management base for recording and browsing of ground fields, field relations (occupied or rented land), cultivation and its tasks, equipment, employees and European cultivations reports and all of them to be performed by the touch of smart phone screen button. The use of software is currently freely available and there are more than one thousand farmers using it in Greece.

Keywords: Android application; Farm management; Mobile computing; Agricultural mobile applications

1. Overview of small farms

Farming in days of financial crisis is becoming more crucial and important to be done efficiently. New and old farmers have more intensive and demanding work in farming trying to get new products on the market or making more productive the existing farms. To achieve the efficiency goal there are many weapons to support the optimization of their work. Technology on grains and chemicals with advice from agriculturists give useful solutions for the farmers. However, these solutions are not enough for efficient farming. Farmers require also easy, handy and
practical support for the management of their farms.

Large scale farms are powerful enough to invest on technology, employ managers and use specialized software for the management of their farm. In these cases farming processes are becoming more efficient because using farm management software they track all the management data and keep records for their investments and working practices. On the other hand, small farms in countries which are not strong financially have none or only very basic management procedures applied. On these situations, farms present many complications which most of them are summarized at the following list:

- A small farming size (3 up to 60 hectares)
- High fragmentation fields (many small fields (0.3, 0.5, 0.8 hectares) scattered in 15 miles radius)
- Many hired fields from different owners that are changing annually
- High difficulty to complete the EU farming declaration form (an annual declaration where farmers define what fields are growing with coordinates). Completely different field logical names used by farmers with the physical name
- No specialized employees for supporting the farming process
- The wall farm work is mainly performed by the individual farmer who is the manager and employee as well.
- Most farm work is performed under pressure with no time to keep records of the works that have be done
- No clear views of keeping records of past year processes
- No any relational information about seed – field – field type – processes – production results
- No information about results of practices been taken on the fields (e.g. percent of success of an applied chemical)
- No ability for easy estimations of project and process planning
- No ability for exact supplies calculation during the process of an applied work
- No detailed records on expenses that have been done on annual use. Most farmers they roughly recall knowledge about where they spend and how much.
- No detailed record keeping of the equipment obtained - sold and its maintenance been performed
- Many part time staff on which there is no exact record keeping of their working hours and process that have been done
- No ability for exact calculations of production cost per hectare
- No ability for cost estimations for a planning year

The above characteristics constitute the difficulties that small farms are facing daily. Many farmers who try to be organised put a lot of effort to keep written records of their management approach but most of these notes are hand written notes which are not well organised, cannot be easily linked and compared to data from previous farming years, and in many cases are lost in the cabs of the tractors and other machinery. As a result of the above status, most farmers are keeping only some main general notes and they try to remember what was the money outcome produced from the grain production. Knowledge extraction from a past year production is not feasible or only for specific fields and yet again only in a rough estimation.

2. Smart phones and small farms

In our days, a small farm manager could have access in a tool that could never imagine. This tool which can greatly improve the management in small farms is called ‘Smart Phone’. A smart phone is not only the device that allow us to make telephone calls, but also has additional features and capabilities that, in the past, you would have found only in a personal digital assistant or a computer-such as the ability to send and receive e-mail and edit Office documents, internet access, Wi-Fi and modern ability, easy touch screen operation and most of all the capability to run powerful custom software. In fact this opportunity has been identified and several mobile applications have been developed for data acquisition in the field [1], livestock management [2] and several other that appeared as commercial mobile applications for farm management (e.g. [3][4][5]).

Obviously, this interest has been raised primarily because a smart phone using specialized software for various farm management processes is the ideal solution for small farm managers. A smart phone can be a mobile office that is very handy, can be carried on in a pocket, stand on at any agriculture machine (tractor, combine, track, bike, car)
and can process data at any time. Farmers usually are not in the office. They move from one field to another and operate machines.

But smart phones have another characteristic that is very important for small farm managers. This is the ‘user interface’. A smart phone touch screen with abilities to zoom in and out with the combination of the simple interface ‘buttons, menus and forms’ with the support of “qwerty” keyboard makes them easy to operate for people who are not very familiar with ICT technology. In this category belong most farmers. Especially, old farmers are not very familiar with technology. Thus, even the best software if it is supplied with bad user interface and not easy operation, it will never be adopted by farmers. Farmers require software that is easy to operate and ask only for the specific data required to complete an operation or a process. Farmers have no time to waste for recording an operation on a field. They will prefer to perform the operation rather than recording it. Thus, software has to be very simple as you can talk to a machine about the operation. To this end it must be said that mobile devices are coming with accompanying tools such as GPS, accelerometer, proximity measurement tools etc which can be used to increase the pervasiveness and the functionality that can be built upon a mobile device.

Another important parameter of adopting and using smart phones in farm management is the cost of obtaining them. In our days, the cost of obtaining a smart phone has falling down enough in a price that any farmer can obtain. Thus, with a small investment, the same one as the cost of buying a reliable mobile device, you can have a smart phone that could be used for a double purpose. Facilities of smart phones such as video players, internet access and emailing that is very important for communication can create the educational background (tutorials of how to use the software) where software use practices can be solved easy with no cost.

All the above characteristics make the smart phones the future of computing in modern societies but also give a hand to small size farmers in order to have a weapon to walk with their management difficulties for an easy, fast and up to date knowledge extraction that can boost their production.

3. FarmManager: an Android smart phone application

FarmManager is an Android application which is developed at the labs of the Technological Education Institute of Serres. The main feature of FarmManager is that, unlike the other tools mentioned before, it is specialised in Greek farming because it is designed and developed to respond to the needs and characteristics of farmers as these are outlined in Section 1. Here, we will present the key characteristics of the FarmManager software that it makes it usable and useful for many agricultural management needs.

3.1. Annual structure

A farming cultivation is managed on an annual use. Thus, FarmManager keeps this annual use database. For this purpose all information produced and recorded during a year is stored in small file that has the name of the working year. In this way, the access to data from previous years is becoming a simple button action. In seconds, you can activate an old year work book and read all the required data. Opening a new year you can easily move job types, field names, land occupiers and many other standard data to this year, so initialization of a new working year can be done very easily. Thus, a job may take a time to initially define some data but these can be easily be moved from one year to initialize a new cultivation year with very small effort.

3.2. Farm customization

FarmManager can be customized. There are no predefined data for processes. Farmers can declare their own job data processes and use them. This makes the FarmManager a flexible and extensible tool which can be applied in many farming purposes and crops. The software is customized according to farmer crop and processes needs.

The farmer is not wasting time to select works and tasks among hundreds of no interesting actions. The farmer/end-user can move straight to five or ten processes required for his management needs and cultivation (Fig. 1). For example a maize grower has a completely different set of work tasks in comparison to a wine grower or grass grower. Thus, a farmer cultivating maize would lost significant time to browse cultivation actions among hundreds of no interesting cultivation tasks. FarmManager allows farmers to define the cultivation tasks applied only for their needs (Fig 2).
3.3. Easy field management

The farm fields are declared straight from the Google map live (Fig 3). With a finger press at the point he is, the farmer can define a field and give a name as he uses it in practice. Most farmers use nick names for the fields which in many cases these arise from their owners or other names. Thus, for a farmer each field has a name which is not matching with physical location or area naming. It is ineffective or even hopeless to have software that uses physical geographical data or codenames or area data instead of names. Farmers will never be able to understand about which field you are talking about and if it is the correct one.

3.4. Land Field data

A farm field is not enough to be defined on a map. A farm field has some significant data that have to be accessible all the time. These data are the size of the field, the geographical location with the coordinates, the type of cultivation, the type of the ground, the relation of the farmer with it (owning – rented) and data of the occupiers (Fig. 4a & Fig. 4b). Land field data are important to exist because they define the whole field status in a year and can be used for EU declaration, agriculturist and management calculation. Initially, only the name and the size are required. In time the farmer has the ability to complete the rest data in order to get the maximization of use.

3.5. Physical field GPS addressing GGRS87

The Greek authorities specialized for Greek farm land management OPEKEPE (Payment and control agency for guidance and guarantee community aid) requires farmers to make an annual declaration of their cultivation fields. In these declaration reports, farmers have to define the structure of their farm in which they describe for each land field the size, the cultivation, GGRS87 addressing, and if it is owned or rented land field. In a case of a rented land they have to write owners data and their VAT number.

This declaration which looks initially easy to be submitted by an individual farmer presents high difficulties. Physical maps are completely different from the farmer fields. A farmer knows only land areas and names of fields. OPEKEPE understands only GPS addressing at GGRS87 format. For this purpose, every year thousands of people are employed all over Greece with one single purpose ‘to make sure that no fields will be missing at the OPEKEPE declaration’. However, many errors happen due to high land transfer from a farmer to a farmer (Greek farming
practices are heavily based on annual rented contracts of land).

FarmManager solves this problem very easily. Straight at the time that a farmer is touching a Google map land field to define for a use, the software automatically calculates the GGRS87 addressing points (Fig. 4c). This service makes the FarmManager unique to assist thousands of farmers to be able to visit OPEKEPE offices and straight from the map to show where their fields are and complete their annual declaration with no errors. FarmManager produces a list of all fields and their related information in the form and layout required by OPEKEPE (Fig. 4c).

![Figure 4. (a) FarmManager land field data, GGRS87 coordinates (b) annual move and (c) FarmManager EU/OPEKEPE declaration report](image)

3.6. Easy job recording process

A farmer is the one businessman that is never in the office and has a very little time to record its operation tasks been performed on the fields. The only time available is the time in the tractor while is changing a field to perform a cultivation operation. A software system it has to be so simple enough to use as you can do it with no thinking.

FarmManager captures this need and with three touches on the smart phone screen you can record a land field operation (Fig 5a). Farmer selects the field name, the cultivation action and save button. The system takes the data with the date and saves them on the data base. For each land field operation there is the ability to keep notes by typing them in. The most important is to keep the record of the operation. Later on, you can process the individual land field operation and add special comments that you may require to remember.

Field data operations can be browsed by the option of a field or operation. Thus, a farmer can get an easy report of what actions been taken on a field or when an operation is performed on fields.

3.7. Employees and Equipment

Farm manager provides the ability to record the part time staff working hours and their work task that have been taken. A result is that a farmer can produce reports of the whole employees tasks and see the cost of extra staff and the work has been done (Fig 5b). Such data can help farmer to make proposal funds for a year and keep a book of what is spend in staff and where. Another entity is the equipment records (Fig 5b). Farmers have a lot of equipment that they buy and sell and also perform services on it. FarmManager with an easy way assists farmers to keep a record of their equipment and their services. Such a tool is very useful for planning repairs and services and also to calculate amount of money invested in equipment and relevant services.
4. Summary

We believe FarmManager is a useful Android mobile application software tool for small farm management specialized in the needs of Greek farming and potentially other countries which share common characteristics with the one discussed in Section 1. Nowadays, the use of smart phone technology with specialized software (FarmManager) will boost the management of small farms in a high level that can provide capabilities which only large farms had so far.

FarmManager is currently available since April 2013 and there are more than 347000 people who read about it [6]. It is currently used by more than one thousand farmers in Greece from which we have received initial positive feedback. This is very much in line with a finding reported in an ICT adoption study back in 2005 [7]. Then the authors analyzed and contemplated: “Probably in Greece and in other countries, which have such high adoption rates of mobile phone technology, it can be used as a Trojan horse to deliver to farmers IT applications and services that are easily accessible and easy to use. Especially with the new high speed cell network protocols such as 3G and GPRS which promise fast multimedia delivery and fast connection to the Internet, mobile phones can be proved as the best devices for Greek farmers”.

FarmManager is an important step towards this development and its adoption rate is very impressing so far. Currently the tool is expanded to support high management requirements such as accountant facilities, ground analysis, store management, production result and annual use knowledge extraction. An initial version for Windows mobile is available and iPhon edition is under development.

References