Agricultural Marketing Information System – Architecture, Framework and Model

Dr. Syed Khizer
Department of Computer Science, College of Computer, Qassim University, Al-Qassim, Kingdom of Saudi Arabia (KSA)
syed_khizer@yahoo.com, syed@qu.edu.sa

Abstract
The process of marketing, finding storage and planting advice is a challenge to farmers. Therefore, there is a need for more reliable, efficient and automated system to help farmers on finding information on storage, marketing and accessing planting advice using present-past agricultural marketing data. Agriculture marketing data plays a very important role in advisory, planning, management and control of agriculture commodities in a country. In this research paper we present a model which focuses on different aspects of developing information system for managing agricultural marketing data. The model presented here can be used to develop Agricultural Marketing Information System (AMIS) and similar systems.

Keywords: Information System, UML Modelling, Advisory System, Agricultural Marketing System, Business Intelligence, Data Management, Data warehousing, Information management.

1. Introduction
Agriculture is the oldest and most important avocation of the world. Agricultural sector has its own requirement of ‘Information System’ like industry or defence. Integrated electronic databases, or any designed integrated on-line information systems for use of farmers, agricultural planners, administrators and agricultural marketing people are not available [8] and similar situation is observed in many countries around the world at this point of time. Information strategies for agriculture have been the concern of policy makers and planners for quite some time. Possible challenges in developing such a system includes the geographical extent of the very large country and most of these sites are in rural areas [1]. A major challenge in the first decade of the new millennium is to organize these resources into more coherent, properly connected and sharable systems. Evidences of cooperation of international institutes and premier national agricultural research organizations in Asia towards efficient information management strategies, which are on since 1993 [6], are strong indicators of the fact that much is required to be done in the area of information management for agriculture.

1.1. Importance/Significance of this Research:
Agricultural marketing information systems helps to know the future requirements of agricultural commodities for the nation. Based on this knowledge government can make the decision to which agriculture commodities and how much subsidy is to be given in future. Henceforth saves the money of the government and make sure proper utilization of subsidy.

Further such systems help in making decision such as which agriculture commodities are required to be grown and how much. This prevents growing agricultural commodities which are not required and growing agricultural commodities in excess. This saves the natural resources like water, land, fertility of soil, use pesticides, insecticides and fertilizers etc. henceforth saves the environment.

Besides all the said importance and applications, one of most important possible application of the system is that it can be used for determining the marketing risk factors associated with the agricultural markets for crops. Syed Khizer et al. [7] has developed a system which uses a similar AGMIS as data warehouse and data mining approach to discover association among crops, agriculture markets and possible strengths of risk factor.

2. Objective:
The model given here will help to develop agricultural marketing information system, which is capable of addressing following objectives [9]:

1. To establish a nation-wide information network for speedy collection and dissemination of market information and data for its efficient and timely utilization.

2. To facilitate collection and dissemination of information related to better price realization by the farmers. This would cover:

(a) Market related collection and dissimilation of information such as market fee, market charges, costs, method of sale, payment, weight-man, handling, market functionaries, development programs, market laws, dispute settlement
mechanism, composition of market committees, income and expenditure, etc.
(b) Price-related information such as minimum, maximum and model prices of varieties and qualities transacted, total arrivals and dispatches with destination, marketing costs and margins, etc.
(c) Infrastructure related information comprising facilities and services available to the farmers with regard to storage and warehousing, cold storage, direct markets, grading, re-handling and repacking etc.; and
(d) Promotion related information covering accepted standards and grades, labelling, sanitary and phyto-sanitary requirements, pledge finance, marketing credit and new opportunities available in respect of better marketing;
3. To Sensitize and orient farmers to respond to new challenges in agricultural marketing by using ICT as a vehicle of extension.
4. To Improve efficiency in agricultural marketing through regular training and extension for reaching region-specific farmers in their own language.
5. To Provide assistance for marketing research to generate marketing information for its dissemination to farmers and other marketing functionaries at grass-root level to create an ambience of good marketing practices in the country.

3. Research Methodology:
The methodology used in this research consist of both the quantitative research methods which were originally developed in the natural sciences to study natural phenomena; the data is quantified into calculations or figures. And qualitative research methods which were developed in the social sciences to enable researchers to learn social and cultural phenomena, it does not involve numbers but basically asks people questions and writing down their responses, the qualitative data sources to be used include observation and participant observation (fieldwork), interviews, documents and texts.

4. Literature Review:
In May 1999 the International Institute of Tropical Agriculture embarked on a program to establish a market information service for agricultural products in Uganda [4].
The Technical Centre for Agricultural and Rural Cooperation (CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union Member States. Since 2000, it has operated within the framework of the ACP-EC Cotonou Agreement. CTA’s tasks are to develop and provide services that improve access to information for agricultural and rural development, and to strengthen the capacity of ACP countries to produce, acquire, exchange and utilize information in this area [3].
Different countries have developed different systems, with variations only partly related to the amount of money invested in the system. They are also related to planning priorities, and the type of commodity produced.
Most countries in Asia operate a marketing information service with the express aim of promoting efficient marketing and raising farm incomes. The form it takes varies according to the level of economic development, and especially the extent to which agriculture has changed from subsistence to commercial farming.
In Indonesia, Japan, Korea, Malaysia, Philippines, Taiwan ROC, and Thailand, agricultural marketing information is a national government service which receives regular government funding. It is usually run by the Ministry of Agriculture or its equivalent, sometimes by several Ministries (for example in Thailand, marketing information it is jointly operated by the Ministry of Agriculture and Cooperatives and the Ministry of Commerce). There are often additional independent services for particular interest groups. For example, Japan has an information service operated by ZEN-NOH, the national farmers’ cooperative organization. Malaysia, a major agricultural exporter, is the only one of the seven not to have a single government service covering all major crops. Instead, each major export crop has its own price information service, run by the special government agency that is also responsible for extension and technical research for that crop. Information about vegetables and other domestic food items in Malaysia is the work of FAMA, the Federal Agricultural Marketing Authority [2].
Agricultural Marketing is an area for the “second generation” of green revolution problems. Market information is an important aspect of Agricultural Marketing. The importance of sound agricultural marketing policies for ensuring fair returns to the farmers can hardly be overemphasized. It, therefore, becomes necessary on the part of regulatory agencies to ensure remunerative prices to the farmers for the sale of their produce, to boost up their efforts for increasing and sustaining the agricultural production. The information is collected and disseminated by use of conventional methods which cause inordinate delay in communicating the information to different target groups, and thus adversely affecting their economic interest. Therefore, there is an urgent need to bring improvement in the present market information system by linking (i) all Agricultural Produce Wholesale markets in the States and Union Territories, and (ii) the State Agricultural Marketing Boards and State Directorates of Agricultural Marketing, with the
Directorate of Marketing & Inspection of the Ministry of Agriculture, for effective and efficient information exchange [5].

5. Design:
This section gives design of the model. We have used Unified Modelling Language for making design specifications.

5.1. Schematic of AMIS System:
The below figure (6.1.) depicts the general outline in simple form and is the crude form of the AMIS system. The system is an integrated collection of hardware & Software capable of providing and managing the agricultural marketing information to/by all its stakeholder.

5.2. Use case diagram of AMIS:
We have categorized all the stakeholders of the system in to three major categories (as shown in figure 6.2. below), as follows:
1. General/average users of the system: This category of users include farmers, marketers, researchers, policy maker, planers, students, exporters, importers, supermarkets, agro processor, extension workers, NGOs, etc.
2. Operators of the system: This type of users include data entry operators, data reporters etc.
3. Managers/Administrators of the system: These type of user will include supervisons, managers of users, data and information managers.

5.3. Activity Diagrams:
This section gives important activity diagrams for different stake holders of the system.

5.3.1. Activity Diagram General/average users of the system:
5.3.2. Activity Diagram for Operators of the system:

5.3.3. Activity Diagram for Managers/Administrator of the system:

6. Data Collection:
First step is collection of data, facts and figures is the important aspect for designing an information system. The second step is the challenge of representing the data in to computers databases. Required data can be collected from different sources and grouped in to the four categories:

- Crop Information
- Crop Arrival and Prices data
- Infrastructure Information
- Agricultural commodity import and export data

The above said categories of data and information can be obtained from following published documents and electronic resources:

- Various Government departments
- Private companies
- Research centres
- Marketing bodies
- Various ministries
- International institutions
- Global organizations etc.

7. Implementation of AMIS:
AMIS will be a web-based information system. It has following three types of web-pages:

1. Static pages: These type of pages contains static information and data.
2. Dynamic pages: These type of pages contains dynamic information and data.
3. Hybrid pages: These type of pages contain both static and dynamic information and data.

7.1. Home web page of AMIS:
This page contains the introductory information and basic information of the system such as: Name of the system, welcome note, date, time, search, today’s weather forecast, News headings, Today’s price; arrival information etc.

Further this page has links and sub-links to access the rest of the pages of the website (7.2 through 7.9).

7.2. Main web page for Market details/Profile:
On this web-page options are provided for users to choose the location (province) and the market of which the user want to see details.

7.3. Main web pages for Collecting crop arrival and prices data (both wholesale and retail):
These two pages will enable the operators to select the location and the market and enter the arrival and prices data for the agricultural commodities.

7.4. Main pages for viewing Historical/past arrival and prices data:
These two pages will enable the users to select the location, the market, the period and the agricultural commodity of which user want view (/print/save) the arrival and prices data.
7.5. Main pages for collecting import and export data:
These two pages will enable the operators to select the country name, agricultural commodity and enter all the details of import and export.

7.6. Main page for viewing import and export data:
These two web-pages enable the users to view, print, download the import and export data of agriculture commodities (commodity wise, country wise, period wise, season wise).

7.7. Main web-page for Infrastructure Information:
This web-page disseminate the information about storage and warehousing, cold storage, direct marketing, grading, re-handling and repacking, etc. to the users.

7.8. Main web-page for planting advice:
Farmers can get tips, planting advices for agricultural commodities from this web-page.

7.9. Main web-page for Crop Information:
On this web-page users can select the crop and view all the details related to the crop. Information displayed includes duration of crop, weather requirement of crop, soil type required for crop, irrigation requirement of crop etc.

7.10. General Pages:
Besides specific and important pages of AMIS listed from 7.1. to 7.9., it will have usual pages like any other information system web-site. We will not gives details of these pages here, as their names itself indicates its contents. They are as follows:
- About us
- Weather data
- Sign In
- Logout
- Discussions
- Forget Password
- News page
- Contact us
- Sign Up
- Help
- Publications

8. Conclusion:
In this paper, we have provided an analytical study of all the services that can be provided by an agricultural marketing information system. We have proposed a framework for the agricultural marketing information system to fulfill the information needs of all the stakeholders of agriculture sector. We have provided the design and procedures that have to be used by the developers to achieve all functionalities and services required in the AMIS. A study on the significance of the model found that the given model is very useful, supportive and helpful for AMIS development. From this it is clear that all the objectives are met and accomplished successfully.

9. Acknowledgement
The author gratefully acknowledge Qassim University, represented by the Deanship of Scientific Research, on the material support for this research with number 1982, during the academic year 1434 AH/2013 AD, under the grant of research priorities.

References:
[1] Dealluck Irengbam (Jan. - March 2012), Agricultural Marketing in Punjab and North East India with Special Reference to Manipur, IJMBS Vol. 2, Issue 1, ISSN : 2230-9519 (Online) | ISSN : 2231-2463
[4] Peter Robbins (March 2000), Design of a market information system for small scale producers and traders in three districts of Uganda, CMIS Shaun Ferris, IITA/Foodnet Project