A Content Management System for Seed Varieties with ESRI Maps

Achsah .P. Prasad

M.Tech Scholar, Department of Computer Science and I.T., SHUATS, Allahabad, Uttar Pradesh, India

ABSTRACT

Seed Varieties Content Management System is an Information Retrieval System and a Content Management System. It is an attempt to introduce Digitization and Modern Technology of ICTs (Information Communication Technologies) to the field of Agriculture. Scientists are inventing new seeds varieties, there is a need to help organize all the data they generate in a manner that will be easily accessible to them in the future or as and when needed, and also those interested to know about the research activities going on can view or browse through. It helps to have information in softcopy format to help distribute it. The data needs to be entered in only once and it will reflect wherever it needs to reflect in the Application thus reducing repetitive work. Even papers regarding these Seed Varieties can be uploaded and students in their final year can have a base from which they can start their research projects from.

Keywords : Agriculture and IT, Content Management Systems for Agriculture Research, Digitization, Information and Communication Technology, Seed Varieties.

I. INTRODUCTION

There is no doubt that technology has brought development in every sector be it business or educational organizations. Technology has helped reduce manual work and has boosted finances. Thus bringing technology to agriculture is seen to be having the same effect. Digitalising everything seems to be the key mantra these days. With the benefits of digitalisation being large, it helps search quicker the information we are looking up, it better withstands and survive natural disasters i.e. data safety is almost ensured; with the ease of copying and backing –up of data. This ease of copying data is possible with the use of databases; as all the data uploaded is in a particular space, and also feeding data in by a non- computer expert is possible with GUI, in fact we can use the same database if we ever decide to go from a desktop application to a web-based application, without having to key in data over and over again.

A CMS is needed to help collect data such as Research Papers Published, and Seed Variety Information in concise and well structured manner using windows forms, and also seed yield information for the variety requires a list of attributes, the windows forms helps remind the Scientist or Admin the key details to upload for any given seed variety. All these information is stored in one place in a summarised form, for ease of access, and for generations to come. With the folder management systems it can be ensured that the practice of package records the traditional way along with modern ways and local wisdom of farmers for better yield for future generations to come and a knowledge system can be built on it with the consolidate practice of package information collected.*[1]*

Well you may ask isn't the internet sufficient to store research papers, consider the following situation. To begin with finding information on the internet is a tedious thing to do because it involves looking through a bunch of search finds that are totally irrelevant to what you are looking for and not only that say researcher #1 publishes a journal paper he might or might not refer to a paper that he wrote sometime back if he does mention it in his current paper then well and good we can see a light link, but say his researcher colleague at the same organization and department decides to write a paper that is irrelevant to the working and findings of researcher #1 then he will not be mentioning his colleague researcher #1's journal paper and the link is not present.Now say for example

researcher #1 is so very enthusiastic and decides to mail everyone his research paper and every one of his colleagues in his department download it on their system and delete the e-mail or downloaded copy because of lack of storage space on their computer to download other more important files for them, and some time later they decide to read the paper but unfortunately discover that they have deleted the file a few days back to make space for some other urgent important document, now if they want to read that paper they need to contact the researcher #1 for the details of the title of the paper and sometimes search engine optimization fails for that paper.Or they can request the researcher #1 to send them a copy now all this communication can happen when the researcher #1 is free to respond to them. Not only that, imagine say in another 10 years how will we be able to collect all the research activities and papers published by a single department of an organization when there are light links and sometimes no links at all among the papers the task complexity gets tougher as years go by.

II. The Proposed System

A Seed Varieties Content Management System (CMS) is the best option to save all the details regarding a department's research papers and the seed varieties developed for ease of access of information on research, and the consolidated collection of Practice of Package for each Grain Type, so it can be put up for presentation in a concise manner for the outsiders and interested people to see. Thus, the Scientists and Students in Research of a particular department within an institute can have a platform to showcase their achievements done ever since the start of the department.

III. Literature Survey

There is a need to maintain a record of the research happening in State Agriculture Universities for better communication with the ICAR situated at the Centre that collects data from various SAU's and keeps a record of on – going research in the country[2]. The main aim of great leaders like Dr APJ Abdul Kalam to transform India into a Knowledge Society where knowledge is generated to help enlighten the citizens and boost their economic generation by use of knowledge and protect the generated knowledge and native knowledge by uploading it to systems like CMS

and websites which is basically IT so that it can be preserved for generations to come and also easily shared by a wider community of people. All of which can help India transform into Knowledge super power. It is also believed that a farmer can also become a knowledge worker if he has the knowledge of the soil he sows, how to interpret weather forecasting information to decide the seeds he sows and also the why and how to use fertilizers [3]. An interested farmer can read the Practice of Package updates and collection from time to time and can gain such knowledge.

The seeds varieties used in 19th century are so different from the ones used now. If we were to maintain a long listing of seed variety hierarchy it would span to several pages keeping a softcopy of this information allows for less space occupancy, [4] it can resists natural disasters with good backup systems in place. And since it will be in digital form; quicker and almost effortless search rather than going through various documents word by word and also data entry could miss out on certain key details while typing in paragraphs regarding a Seed Variety in a word document. Whereas using Windows Forms gives a structured template of key details to enter and saves time typing paragraphs. And there is more control over editing and deleting unlike working with word or excel where even hitting backspace by mistake and forgetting can delete or make changes while probably working on another area of the document or spreadsheet. Whereas with GUI based Windows Forms we have specific buttons to help edit or delete data present in the database. Since database is used it requires only a one-time entry of data that gets reflected on all the windows forms in whatever format it is required in. And upgrading to a website will be easy as the same database can be used.

In Africa, data is been collected from farmers via sensors, photography etc. When all data is collected it is analysed digitally several operations like classification, clustering, data mediation is being done by using data - mining tools and this analysed information is been shared with farmers and their productivity of their farmers have been improved. A knowledge – base expert system can be brought forth with all this knowledge collected [5]. Various package of practice and traditional practices and local farming wisdom of farmers can be collected

all in one spot and this collection can act as a bridge between today's content management system and tomorrow's knowledge – base system [1].

In China, agricultural community has been using several systems like portals, mobile phones, email systems to communicate with the farmers and has brought about positive results regarding the yield and this is all possible due to information distribution. Even in certain parts of India, it is reported that the use of information Technology provided Agriculture Services by farmers helps them make better decision regarding which seed to used and how to cultivate crops better and has helped their farms produce higher yields than usual and also has improved their livelihood drastically [6].

In India, the EID Parry's Sugar and Fertilizer Factory distributes information and services to the sugarcane growers near their area via Kiosks to help improve the productivity of their fields and also helps them to sell their produce to the sugar cane factory by providing them online – forms to fill to enable a Single-Window System to help the sell their produce at a fair price. This has helped the sugarcane farmers with the sugarcane production and the Factory has helped itself with the sourcing. Thus, creating a win-win situation for the factory and the farmers [5].

In the year 2008 Indian Farmers Fertilizer Company joined their hands with BhartiAirtel to form the IFFCO Kissan Sanchar Limited (IKSL) they not only provide Agriculture based information to farmers by SMS and Voice Calls via Green Sim and helpline services, they have an application IFFCO Kissan to help with Crop Advisory, Agro-Climate Advisory, a library of Articles, and a mechanism through which a farmer can post questions to the experts [7].

In Malaysia, they have an "Interactive Web-Based GIS for Paddy Precision Farming" helps farmers print a copy of Variable Rate – 'fertilizer application' through Maps and historical data on paddy yield per lot in previous seasons [5].

IV. Materials and Methods

In Seed Varieties Content Management System mainly Visual Studio 2017 Community edition [8] and SQL Server Management Studios 2017 [9]was used.

Itextsharp library [10] is used to make PDFs SharpMap library [11] is used to create map with ESRI format shape files from diva-org [12].

The Data – Flow Diagram Level 1 is as given in Fig.1. Here it is seen that with the Seed Varieties Content Management Systems, the Admin can upload information regarding seed varieties to the database via a login process and well-built GUI Windows Forms and can also generate reports and interact with an Interactive Map for Seed Yield information and take a print of the map. And both the User and Admin can query the system using GUI controls and Search-boxes.

The CMS has a variety of modules that helps in managing the seed variety characteristics information, the papers or articles information, and practice package via a folder management system, and seed yield information which can be converted into visually represent-able map that can be taken print of by generating a PDF of the displayed map and data-table which can be highlighted for a particular seed variety to represent the states and districts where a particular seed variety has been tested for its Yield Information and the data – table containing Seed Yield Information for that particular seed variety.

Reports can be generated based on selected grain-type and also based on year of release by typing the year in the search box that those seeds received government approval in. This would result in only those rows of Seed Variety characteristics being shown in the datagridview and it can be generated as a PDF by clicking on 'Generate PDF' button and a print can be taken. Fig.1, shows the various processes that the system can perform based on the request of the user and Admin.
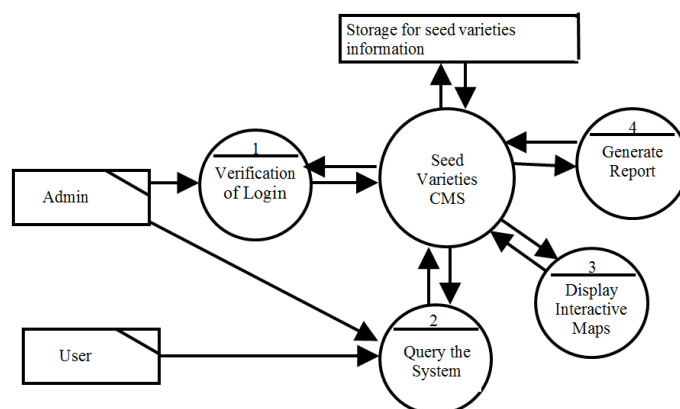

Figure1. Level-1 DFD for Seed Varieties CMS.

V. Results and Discussion

As shown in Table 1, in India over 60% of the population works in the Agriculture Sector compared to Canada which is a technologically well – developed country where they have 15% of workforce employed under Agriculture Sector and not only that it is a sustainablely developed nation where they can afford to export their produce as a contribution to other countries out of their huge produce.Its because they are using new technology tools, seeds, and making use of the data analytics using well-built software and information regarding the latest research; the spread of information happens via ITC.

Table 1. Comparison of the agriculture employment and GDP of India and a well developed country like Canada. *[13][14][15][16][17]*

Applications	Pdf Report Generation	Dynamic/ Interactive Seed Yield Map	Dynamic/ Interactive Soil Map	Discussion Platform	Search bar	Package of practices/ Agro Advisory
Kissan Suvidha	No	No	No	Yes	No	No
MyAgriGuru	No	No	No	Yes	Yes	Yes
IFFCO Kissan	No	No	No	Yes	No	Yes
Agro Star	No	No	No	No	No	Yes
Central Agriculture Portal Version 1.0	No, only provides Graphical Report on the web pg.	No	Yes, in future it will be implemented.	Yes	Yes	Yes
Seed Varieties CMS	Yes	Yes	Yes	Yes	Yes	Yes

The Seed Varieties Content Management System (CMS) when compared to the exisiting applications and portal in the field of agriculture in India we find the CMS provides a search bar and also it provides a dynamic interactive map as Shown in Table 2. For the comparison KissanSuvidha (2008) Application *[18]*, MyAgriGuru (2017) Application *[19]*, IFFCO Kissan (2008) Application *[20]*, AgroStar (2012) Application *[21]*, Central Agriculture Portal Version 1.0. (2012) Portal *[22]*are compared with the Seed Varieties Content Management System.

Table 2. Comparison between Seed Varieties CMS and other Agriculture Applications and Portal in India.*[18][19][20][21][22]*

Country	GDP of Agriculture	Total Area Under Farming	Total number of employees under agriculture	Percentage of workforce
India	17.32%	194.4	600 million	53%
Canada	8%	67.6	2.2 million	15.1%

VI. CONCLUSION

In conclusion the Seed Varieties CMS with ESRI Maps for Seed Yield Information, Seed Characteristics, Practice of Package and published papers, and also report generation is a good change in this Agriculture digital – information world and it helps reduce work load of updating the content and helps work the Content Management System without much in-depth coding knowledge or database knowledge for the admin that updates, the system helps search the file or the characteristic data regarding a particular seed, it also helps the report generation task and visualize the seed yield information. It also helps provide a base of research papers form their professors and their seniors research papers from which students can be inspired to do their research.

VII. REFERENCES

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