Int. J. Adv. Res. in Water Resources and Hydraulic Engineering
Volume 6, Print Issue 1 - 2023, Pg. No. 25-34
Peer Reviewed Journal

Research Article

Revolutionizing Agriculture: A Cutting-Edge Phase-1 Water Collection App Empowering Farmers

Suraj Sharma[1], Karan Jot Singh[2], Deepak Kukreja[3]

[1,2,3]CSC Department, Student, Chandigarh University.

I N F O

Corresponding Author:
Suraj Sharma,
E-mail Id:
19BCS1346@gmail.com

How to cite this article:
Suraj S, Singh KJ, Kukureha D. Revolutionizing Agriculture: A Cutting-Edge Phase-1 Water Collection App Empowering Farmers. *Int J Adv Res Wtr Resrs Hydr Engg* 2023; 6(1): 8-17.

Date of Submission: 2023-03-11
Date of Acceptance: 2021-04-31

A B S T R A C T

In order to increase production and the number of people working in agriculture, technology must be used effectively. Understanding how to employ technologies in the agricultural sector effectively is the main goal of this study article. Many different kinds of technology are used to increase productivity. The main factors affecting the adoption of technologies, types of technologies, technologies used in the agricultural sector, advanced agricultural technologies currently in use, areas of information technology, the function of information technology in managing agricultural education have all been taken into consideration. The agricultural industry needs to get familiar with new technologies like biotechnology, nanotechnology, high-tech protected farming, contemporary irrigation systems to increase productivity if it is to grow and develop effectively. These technologies would prove useful in boosting productivity and profitability if they were used properly. The use of technology would help farmers maintain their prospects for a living.

Keywords: Smartphone, Data Mining, Database, Farmer-To- Supplier, Dealers, Retailer, Supplier, Crop, Roid Technology, Agricultural Sector, Production, Sustainable Farming Systems, Information Technology

Introduction

People in rural areas are thought to work primarily in agriculture. Modern and new methods must be applied in the agriculture industry in order to feed the growing population. In order to push yield frontiers forward, utilise inputs creatively, diversify towards more sustainable and high-value cropping patterns, new technologies are needed. These are all knowledge-intensive technologies that need both capable farmers and an effective research and extension infrastructure. It also calls for a reinforced interface, where the focus is on a shared interchange of information that benefits everyone. The motivation for using agricultural technologies is said to be making efficient use of resources. A key factor in the country's overall growth and development is an improvement in agricultural growth. The rationale is that this industry provides 65 percent of the population with a living wage. Amounting to 14% of the GDP, agriculture does, however, contribute to this figure. A number of agricultural revolutions have boosted the industry. These include the Information and Communications Technologies (ICT) Revolution, the Green Revolution, the Evergreen Revolution, the Blue Revolution, the White Revolution, the Yellow Revolution, the Biotechnology Revolution. Utilising technology is crucial for increasing productivity, what is needed is the expansion of these established systems. The most

important factor in agricultural expansion is considered to be infrastructure-assisted agriculture extension. The private sector's involvement would speed up the adoption of new technology in this industry (New technology in Agricultural Development, 2014).

Factors relating to Adoption of Technologies

Technology adoption factors may have an impact on the development of sustainable farming systems. It is a broad concept that is influenced by the creation, dissemination, use of current and emerging biological, chemical, mechanical techniques at the farm level, all of which are included in farm inputs and other forms of capital (Adoption of Technologies for Sustainable Farming Systems, 2001). A difficult and contentious topic for farmers, extension agencies, agriculture businesses, policy makers is the adoption of technologies for sustainable farming systems and other agricultural practises. To meet a variety of shifting and varied demands from consumers and the general public for food, fibre, other related goods and services, the agricultural industry needs to utilise a wide range of evolving technology and farm practises across many different farming systems and structures. The results are frequently portrayed as having uncertain consequences on sustainability. The agricultural workers and farmers need to gain a sufficient understanding of how to employ technology to produce. Technology use has increased as a result of farmer demand. New technology have long been a target for farmers looking to save expenses. Additionally, customers are demanding low cost, high quality food that is being produced using organic methods in many nations, with more variety, consistency, year-round availability. This is due to rising incomes, improved knowledge, better communication channels. The desire from customers for their food to be produced using methods that limit environmental constraints, conserve natural resources, give more consideration to rural practicality and animal welfare is growing at the same time. The sources of supply and the level of competition are expanding due to trade liberalisation. The media, pressure organisations, food retailers, processors strongly inform farmers about the various needs, which are reflected in policies.

Technologies are used and exploited in various ways depending on the nation. The various ways and levels at which they are implemented are a result of the many policies and concerns surrounding the achievement of sustainable agriculture. In some nations, the development, acceptance, distribution of technologies are governed by market signals, voluntary co-operative industry-led approaches, other factors. Government intervention has received a lot of attention. These governments direct financial support for research, payments for dissemination and implementation, legal constraints, information, help are all examples of involvement, which can range from a supporting to an obligatory role. Moreover, a key element in determining which technologies are adopted at which farm locations is the general framework of agricultural policies and the level of support.

Research initiatives, farmer education and training programmes, guidance, information are all moving in the direction of striking a balance between economic effectiveness and social and environmental sustainability. The main goal of the research and recommendations was to boost profits and productivity. The emphasis is on reaching those goals in a sustainable way, which necessitates using technologies and altering farming methods. The profitability of the technology used in the agricultural sector is not always obvious. To identify the technologies that would be useful for raising production, research has been done. Biological pest management, biotechnology, information technology, bioremediation, precision agriculture, integrated and organic agricultural systems are some of these priorities. Other challenges, such as those involving institutions, educational and training systems, the importance of both public and private research initiatives, must also be addressed. Some sustainability challenges are resolved through changes in the types and locations of agricultural output rather than through technical solutions.

Technologies have been developed and deployed on the worldwide market, but they also have an effect on sustainability outside of farms. There are universal industries for both traditional and more recent technologies, particularly those connected to biotechnology, information, precision farming methods.Although those technologies are frequently distributed on the domestic market, local markets are where they are used. However, farm level adoption had consequences on sustainability that went beyond the farm. Resolutions on the adoption of technology at the farm level are frequently linked to those made elsewhere in the food chain as a result of increased vertical integration, whether through formal ownership structures or contractual agreements along the entire food chain. Technology adoption is multidisciplinary and takes into account goals for sustainable agriculture.

Technology adoption entails risk and trade-offs. It is crucial for the technologies to support an economically effective agricultural sector, the financial viability of the farmers, improved environmental performance in order to create sustainability. Technology is developing quickly, information on the costs and advantages of implementing new technology in agriculture is frequently insufficient. Therefore, decisions on the adoption of technology are made in an environment of ambiguity with a significant amount of trial and error in its application, the rate and extent of adoption vary noticeably across farmers. The

organisation of the farms and the number of farmers who are able to protect their financial positions in the future may be significantly impacted by this.

The implementation of sustainable farm technologies is being aided by research and development initiatives, the movement towards better farmer education and training, the shift in the focus of guidance, quick and affordable ways of disseminating and exchanging information, the availability of financial resources, pressure from consumers, non-governmental organisations, the media, the general public. Many policies, including those that deal with agriculture, the environment, research and development, offer a mix of incentives and barriers to the adoption of new technologies. Farmers' operations are gradually constrained by environmental rules as well as legislation, animal welfare standards, public health policies.

Policies frequently send out contradicting messages, which makes it difficult for technology to be accepted. Some agricultural methods encourage the spread of agriculture on ecologically sensitive terrain, the overuse of natural resources, the exemption of farmers from having to take into account how the environment affects other economic sectors. Numerous food policies are reflected in the value of land, encouraging increased production intensity and influencing the technology used. Some agricultural policies require farmers to adhere to environmental restrictions in order to receive subsidies, but they do so at levels higher than necessary in order to make up for environmental harm caused by other agricultural policies. Farmers' contributions to the environment are compensated in certain nations but not in others.

To exploit technologies and farming practises, farmers need to be properly educated and informed. When farmers are confident that their investments will be profitable, they will invest. Agricultural policy may alter the costs that farmers must pay for inputs and outputs, which may affect their investment choices and result in unsustainable agricultural methods.From a societal standpoint, levels of adoption may be subpar where the environmental advantages of using sustainable technologies are anticipated to accrue to persons other than farmers and where there are no markets for the advantages. Farmers won't be motivated to adopt ecologically friendly technologies if the expenses of the environmental effects of current farming practises are covered by other industries.

Production, productivity, farm incomes, employment, trade were only a few of the generally simple and quantifiable measures used to evaluate the impact of agricultural innovations. Considering environmental, social, ethical factors makes evaluating sustainability more complex. In order for farmers, policymakers, other stakeholders to recognise which sustainable technologies work, which networks can best facilitate their distribution and implementation in various conditions, at what costs and benefits, it is frequently unclear how the various components of sustainability relate to one another, what should and can be measured, how the results are to be understood.

Types of Technologies

Software, hardware, org- ware are the three categories into which technologies are frequently divided. Understanding the distinctions between various technology kinds as well as their synergies and complementarities is crucial to comprehending how technology is used in the agricultural industry. Hardware refers to tangible tools, software to the procedures, aptitudes, information necessary for using technologies, org-ware, short for organisational technologies, refers to the legal and administrative frameworks governing the ownership of technology. Hardware in the agricultural sector is represented by various crop types, software by farming techniques or research by new farming kinds, organizational-ware by the regional institutions that support the use of agricultural adaption technologies.

The adoption of water harvesting technology is an illustration of technical innovation that has utilised all three categories of technologies. Early in the 1980s, farmers created techniques for restoring degraded land by raising the quality of the soil. This is accomplished by digging tiny holes in the ground, into which farmers plant sorghum and millet after adding small amounts of manure. The customary planting pits are used to complete this operation. These holes contain water and nutrients that are precisely concentrated where they are needed and hold water for a very long time. This aids in the recovery of the damaged ground and helps the plants withstand dry spells better.

Hardware can include the seeds or trees that are produced in the pits. The procedures for digging the pits and enhancing soil fertility can be thought of as software, the farmer-to-farmer field schools used to disseminate the knowledge to other farmers in the area are known as org-ware. (Agricultural Sector Technologies for Adaptation, 2014).

Utilizing these three types of technologies will ensure the expansion and development of the agriculture sector. Hard technologies or hardware are prioritised and frequently used in isolation, which is an issue of concern. When farmers employ these technologies, it is essential that they are well informed and use them in a responsible manner. The creation of training facilities has allowed for the dissemination of knowledge and information to farmers

on how to use technologies to increase productivity and profitability. In order to implement these three types of technology in a way that is mutually beneficial, the countries require encouragement and support. Technology applications that are practical and sustainable must be used in the agricultural industry (Technologies for Adaptation in the Agricultural industry, 2014).

Technologies used in the Agricultural Sector

Utilising technology in the agricultural industry is primarily intended to boost productivity and ensure that there is enough food for everyone. The following technologies have been mentioned: 2014: New Technologies for Agricultural Development.

Biotechnology

Use of biotechnological tools in agriculture could make food crops high yielding and more vigorous to biotic and abiotic problems. This could soothe and increase food supplies, which is important against the background of increasing food requirements, climate change and land and water scarcity. In 2012, 170 million hectares, by more than 17 million farmers in around 12 percent of the global arable land were planted with genetically modified crops, such as soybean, corn, cotton,and canola, but most of these crops were not grown primarily for direct use. In India, genetically modified cotton, biotechnology cotton was first commercialized in 2002 and in 2012, over seven million farmers had adopted this technology on 10.8 million area, which is equivalent to 93 percent of the country's total cotton area. Biotechnology cotton has positively increased the profitability of the farmers and simultaneously reduced the use of chemical pesticides in this crop significantly. The introduction of biotechnology has reduced food insecurity by 15 to 20 percent amongst the Indian cotton growers.

Nanotechnology

Nanotechnology can be used in agriculture in numerous ways. It can help in promoting soil fertility and balanced crop nutrition, effective weed control, enhancing seed emergence using carbon nanotubes, delivery of agriculture chemicals, field-sensing systems to scrutinize the environmental stresses and crop conditions and improvement of plant traits against environmental pressures and diseases. Nanotechnology makes available significant opportunities for the development of innovative products and applications for agriculture, water treatment, food production, processing, preservation and packaging. Its use may generate potential benefits to the farmers, food industry and consumers alike. Nanotechnology based food and health food products and food packaging materials are available to the consumers in some countries and additional products and applications are presently in the research and development stage. Nanotechnology has a great potential in revolutionizing food packaging. Nanoparticles such as titanium dioxide, zinc oxide and magnesium oxide, as well as a combination of them, once functionalized can be effectual in killing microorganisms and are less expensive and safer to use than metal based nanoparticles.

Protected Cultivatio

Protected cultivation or greenhouse cultivation is the area where production of horticultural crops has improved qualitatively and quantitatively. In India, the area under protected cultivation is presently 25,000 hectares. While the greenhouse vegetable cultivation area is about 2000 hectares. Having restraints of land holdings, rapid urbanization, decreasing crop production, decreasing biodiversity and ever increasing population, demand for food, specifically vegetables has increased multiple and protected cultivation. These factors have offered a new dimension to produce more in a limited area. Poly-houses can also be utilized for rain water harvesting. The irregular annual demand for a 175 square metre poly-house is of the order of 52,000 litres. The semi-annual demand for a crop of six months duration is 26,000 litres of water. In a region with an annual rainfall of 400 mm, the rainwater falling on the roof of the poly-house is of the order of 70,000 litres. Assuming a collection productivity of 80 percent, 56,000 litres of rainwater can be harvested, which is more than the annual demand.

Farm Mechanization

India has a high share of labour (55 %) with lesser contribution to farm mechanisation (40 %). Making farming techniques less remunerative leads to an increase in the poverty of the farmers. One of the major blockages in farm mechanization in India is 138 million land holdings, which are large in comparison to only two to three percent of the population having landholdings in the United States of America. Farm mechanization and use of modern gadgets, machines, equipment and tools for well-timed and effective completion of operations in agricultural field is one of the most important factors for maximizing productivity. Small machines, suitable for horticultural operations in the hills and mountains will improve operation usefulness and farm income. Farm mechanization will help to improve the overall productivity with lowest cost. Farm mechanization can help in 15 to 20 percent savings in seeds, 15 to 20 percent savings in fertilizers, 5 to 20 percent increase in cropping intensity, 20 to 30 percent savings in time, 20 to 30 percent reduction in manual labour and 10 to 15 percent overall increase in farm productivity.

Use of Modern Irrigation Methods

Availability of water is regarded as the most essential aspect for increasing productivity in agriculture. In India, around 78 percent water is utilized in the agricultural sector and

the remaining is made use of, for industry, drinking and other purposes. Therefore, it is essential to increase the water storage facilities. Dry land agriculture should be the main focus, as more than 60 percent of the cultivated area within the country is without proper irrigation methods. The water use efficiency under conventional flood methods of irrigation, which is primarily practised in Indian agriculture, is low due to substantial conveyance and distribution losses. Recognizing the rapid decline of irrigation water potential and increasing demand for water from different sectors, a number of demand management strategies and programmes have been introduced to save water and increase the water usage efficiency in Indian agriculture. Irrigation is vital to the global food supply as 18 percent of the world's irrigated farmland yields 40 percent of the world's food. Less than four percent of the world's irrigated land is equipped with micro-irrigation systems.

Modernize Technology Transfer Tools

Technology transfer in agriculture needs to put emphasis upon main involvements at different stages of the crop from sowing of seeds, crop protection, harvesting, post-harvest management to marketing. Technology transfer needs operative collaborating groups like Self Help Groups and Farmers Clubs, which should become tools of distributing information about various government sponsored schemes. These entities will help in co-ordinating with various government departments for developmental activities. As central government has an aspiring programme of connecting every Gram Panchayat of the country with internet facilities. These Gram Panchayats should become technology transfer hubs to the farmers. Internet and mobile phones are important tools to impart knowledge on new developments, improved methods of cultivation and technologies in the field of agriculture. These tools can be beneficial in distribution of weather data, agro climatic conditions, latest information on prices of agriculture produce to farmers. Krishi Vighyan Kendras (KVKs) have been established in each district of the country and now these are the pillars of technology distribution within the country

Advanced Agricultural Technologies used in the Present Existence

Advanced agricultural technologies used in the present existence have been stated as follows: (New Technologies in Agricultural Development, 2014).

Tractors on Autopilot – GPS tractors, combines, sprayers and more can precisely drive themselves through the field. After the user has told the on-board computer system how wide a pathway a given piece of equipment will cover, he will drive a short distance setting A & B points to make a line. Then the GPS system will have a track to follow and it extrapolates that line into parallel lines set separately by the width of the tool in use. These systems are capable of tracking curved lines as well. The tractor system is tied to the steering, assisting in keeping it on the track.

Swath Control and Variable Rate Technology - Building on GPS technology are swath control and variable rate technology (VRT). This is where direction really begins to show a return on investment. The farmer is controlling the size of the swath, a given piece of equipment takes through the field. This point is a visual representation of how swath control works. The savings come from utilizing fewer inputs like seeds, fertilizers, insecticides, pesticides, herbicides, etc. Since the size and shapes of fields are asymmetrical, one gets bound to overlap to some extent in every application.

Telematics This technology is the equipment to talk to the farmers, equipment dealers and even other equipment. When one has to bring work to a halt, due to some problem within the equipment, with telematics, the deal can access the on-board diagnostic system of the tractor. On the basis of the problem, equipment can be fixed right from the dealer. In this way, the farmers get back to work and their time of visiting the dealer also gets saved. Farmers are able to keep track of what field equipment is, fuel consumption, operating hours and much more. This technology also facilitates communication between tractors.

Livestock – Livestock has been contributing to generate productivity in the agricultural sector to a major extent. Therefore, it is important to take care of their needs. Collars developed for livestock are helping the individuals to keep track of their herds. Sensors in the collars send information to a rancher's smartphone giving the rancher a heads up on where his cattle might be, or maybe they are in some problem. The individuals are able to keep track of in what positions and situations their herds are. It is a kind of telematics for the herds. In rural areas, rearing of livestock is an important area and when farmers and agricultural labourers are engaged in their occupations, it is vital to keep track of livestock.

Mobile Technology – In the present existence, the use of mobile technology has become productive to a major extent. It is playing an imperative part in monitoring and controlling crop irrigation systems. With using proper equipment, a farmer is able to control his irrigation systems, instead of driving to each field. Mobiles and computers are facilitating these processes to a large extent. Moisture censures in the ground are able to communicate information about the levels of moisture present at certain depths in the soil. This leads to more precise control over the water and other inputs like usage of fertilizers, insecticides, pesticides that are applied by the irrigation pivots.

Crop Production – In order to improve crop production, there are number of areas that need to be taken into consideration. The farmers need to ensure the seeds, equipment and other materials that are made use of are of good quality, the tasks and functions are performed in an appropriate manner and they possess the required skills and abilities. They need to possess adequate knowledge and awareness to utilize technology in an appropriate manner. Weather modification is a technique that is necessary to create a suitable climate for crops. When perfect climate for crops is created, it leads to an increase in production. For this technology to succeed, it needs to be applied for a long term.

Field Documentation – The on-board monitors and the GPS systems, the ability to document yields, application rates, tillage practices is becoming manageable and more specific every year. In fact farmers are getting familiar with the concepts, where they have valuable and useful data, that it can be overwhelming to figure out how to implement it in an effectual manner. As harvesting equipment moves through the field, it calculates yield and moisture, as it goes tying it in with GPS co-ordinates. Upon completion, printing takes place of the map of the field and these are often referred to as heat maps.

Biotechnology - Biotech or genetic engineering (GE) is not a new technique, but it is an important tool with much more potential, yet to be unleashed. The form of GE most people have possibly heard of is herbicide resistance. The other would possibly be insect resistant traits. The use of insecticides and pesticides are made use of to control pests that may damage the crops. In most cases, biotechnology toxins are made use of that is the same toxin found in some organic pesticides. Insecticides and pesticides should be of good quality that crops can easily adapt to and help in augmenting productivity.

Weather Modification – Weather modification is the conscious modification or manipulation of the environment, with the main purpose of bringing about changes in the weather conditions. A recognized technology is known as cloud observation, to increase the chance of rain or snow to regulate the local water supply. In the distant future, with advancements, there will be climate engineering, intervening directly in the climate system. Two main technologies that are made use of to counter global warming are the removal of carbon dioxide and the regulation of sun radiation.

Method and Materials and Process Used:

The focus carried out in this study was to build a mobile-based clean water ordering application design using the user-centered design method. The stages carried out in this study are preceded by the requirements data stage, followed by creating a design interface. After the interface design has been designed, the next step is to make a prototype design. This prototype's entire system involves several respondents from the customer and the service provider to evaluate the prototype design to obtain results according to the user's wishes and needs. The next stage is designing applications based on the previous prototype design. This application design also involves respondents evaluating all design interfaces made according to users' wants and needs both from the consumer and the service provider. If the user needs are fulfilled, then the last stage is where the proposed system design will be analyzed whether the system design acceptable or not based on the size of the user- centered design perspective. The framework of these stages can be seen in figure 1.

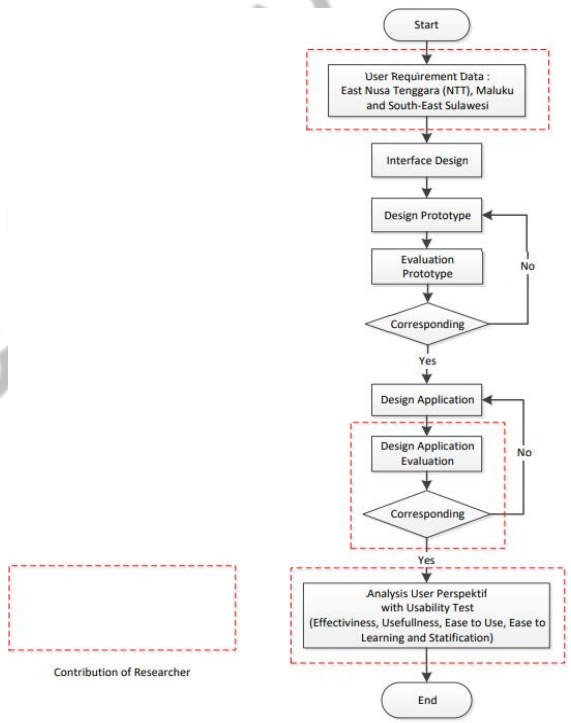

Figure 1.Resear Flow Diagram

Requirement Data

In this study, two stages are passed to get user needs: literature studies and field studies. In the literature study phase, the researchers collected several previous studies from various sources such as paper, internet, books, other sources. Then at the field study stage, researchers collected information from users of clean water ordering services and service providers through direct interviews in three provinces, namely: East Nusa Tenggara, Moluccas, Southeast Sulawesi.

Stage of Needs Analysis

This stage will analyze user needs based on user characteristics to build a design for ordering clean water

applications using the UCD process steps, as shown in figure 2 Plan interface design based on user needs At this stage, interface design planning will be carried out based on user needs from information obtained when interviewing service providers and users of ordering water services from three places, namely the NTT, Moluccas, Southeast Sulawesi provinces. Determine user specifications: At this stage, the user specifications are determined by looking at the field's criteria, among others, based on age, gender, occupation, location, ability to operate a smartphone. Build an interface design: At this stage, the UCD cycle process will be implemented. The process of creating the first interface design continues with the prototype up till the evaluation of the application design based on user requirements. If the needs of the user are not addressed, the cycle will continue. In contrast, if user needs are satisfied, the UCD cycle process will come to an end. User-perspective analysis: At this step, usability testing will be done on the clean water ordering applications' designs. The following aspects of usability testing will be done: effectiveness, usefulness, usability, learnability, stratification. A usability test's purpose is to assess how successful the programme under development is.

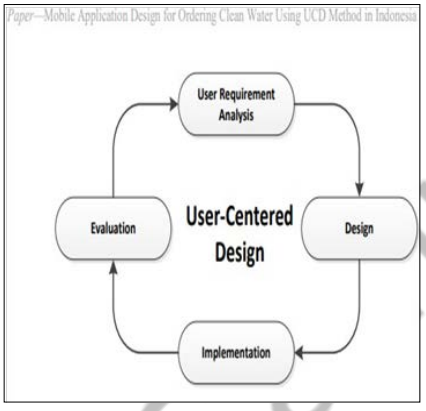

Figure 2.UCD Process[25]

System Diagram

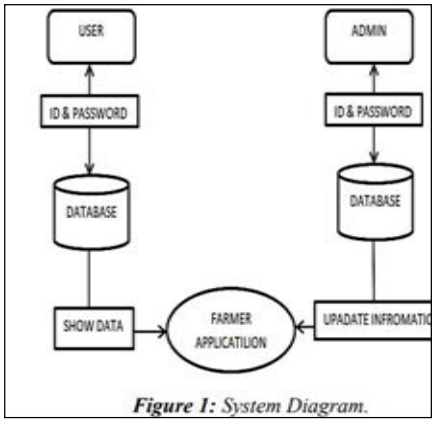

Figure 3.System Diagram

We think Farm Manager is a practical Android mobile application software tool for small farm management that is tailored to the requirements of Greek farming and perhaps other nations that have similar features to those covered in Section 1 and other relevant sections. Nowadays, the management of small farms will be enhanced to a high level by the use of smart phone technology and specialised software (FarmManager), which can offer capabilities that until recently were only available to large farms. Since April 2013, Farm Manager has been available, more than 347000 individuals have 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 a crucial step in this direction, thus far, its acceptance rate is really impressive.

To meet high management requirements including accountant facilities, group analysis, store management, production results, information extraction from annual use, the tool is now being expanded. A preliminary version for Windows Mobile is already available, an iPhone version is being created.

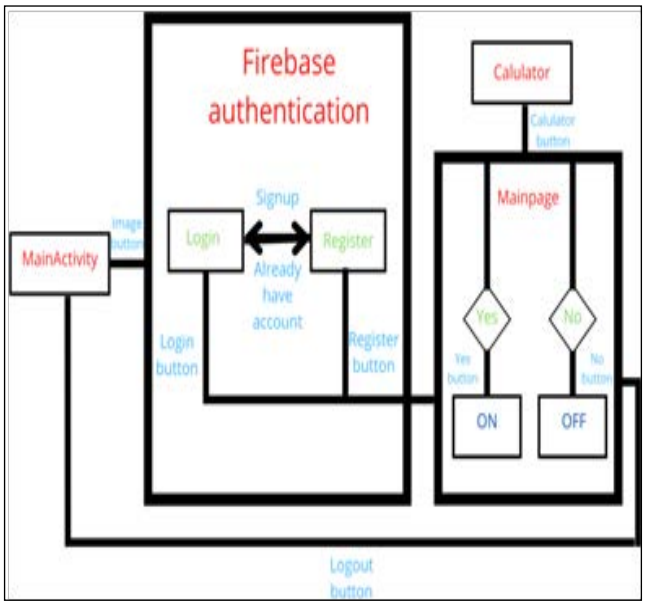

Figure 4

Data flow diagram(DFD)

Adminmodule

The entity-relationship diagram is the fundamental data modelling notation. The admin is given complete control over the application to handle or manage it. Administration has complete control over all data base management, information management, information inserts, information updates, information deletions. The admin is given access to a login, dashboard, customer, item information interface. Admin Enter the admin dashboards easily with your admin ID and password; these dashboards have options for baseboards, customers, item information. You may see the list of customers who have registered for the application in client, along with all the information on the list form. Administrators may remove a person's personal data. Item insert, product sale information, product sale are the three sub-parts of the item information choice.Inserts are used to add farming- or product-related information to items. Product sale information and sales that are in accordance with marketing add and remove products, as well as the ability for any user to purchase the product with just one notification to the administrator, are all included.

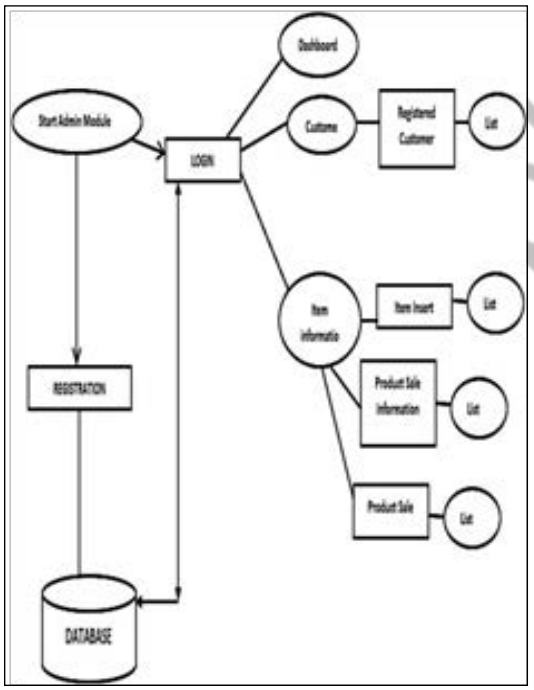

Figure 5

Farm Manager Farm Manager Farm Manager Its adoption rate is pretty impressive so far, according to 2005 analysis of Farm Manager. The application is currently being developed to serve high management requirements including accountant facilities, ground analysis, store management, production result, information extraction from annual use. Both an initial version for Windows mobile and an iPhone version are in the works.

Figure 6

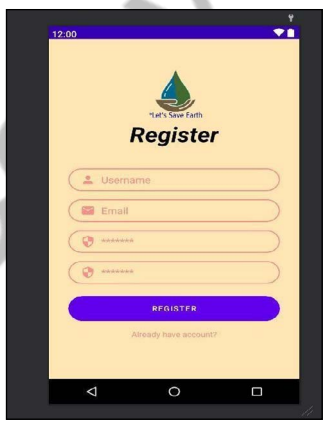

Figure 7

Figure 8

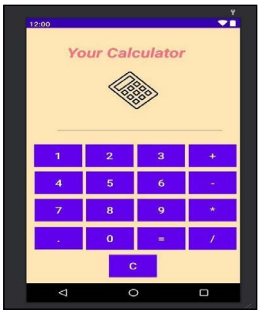

Figure 10

Technologies Required Android

The Android operating system's integrated development environment (IDE) is called Android Studio. It is compatible with every operating system, including Windows, macOS, Linux. It serves as an IDE substitute for the eclipse Android Development Tools (ADT) for developing Android applications. Additional capabilities offered by Android Studio include a quick emulator, a configurable Gradle-based build system, built-in support for the Google Cloud Platform. APK files are created when applications are created in Android Studio. In May 2013,roid was originally introduced at Google I/O.Android Studio gives us the ability to create and code Android applications. It provides powerful editor tools for creating original user interfaces as well as emulators for various Android versions to test android applications. The framework known as Android Studio has all the tools required to create Android applications and games. It includes every API needed to build an application.

JAVA

Object-oriented programming is what Java is all about. It's a language that works on any platform. Any Android application's front end can be designed using Java and a SQL database that has been setup. Additionally, desktop applications can produce

Firebase

The Firebase Realtime Database is a database that is hosted in the cloud. Data is synchronised in real-time to every connected client and stored as JSON. All of your clients share a single Realtime Database instance and are immediately updated with the most recent data when you create cross-platform apps using our Apple,roid, JavaScript SDKs.

Advantages

This app is simple to use and gain access to.
Give details on various crop varieties, soil, fertiliser, etc.
experts offering their recommendations for improvement.
Experts or agricultural officers provide answers to the farmer's questions.
Farms-related dashboard and report.
It provides a marketing platform.

Future Scope

Any software, programme, or online application cannot ever be deemed comprehensive in every way because most things in the world of information technology change more frequently as the requirement changes with the environment.Similar to that, there is room for improvement in this programme. For improved performance, the proposed system could need the modifications listed below:

There is potential to offer the ability to periodically take a database backup from the suggested system so that the data can be restored.

Conclusion

The research suggests using data mining methods to give farmers knowledge about crops, soil, fertiliser, pesticides. With the primary goal of satisfying people's needs for food, the relevance of technological use in agriculture has been acknowledged. Although India's agriculture has improved, its principal horticultural and agricultural crops are less productive than those in other nations. The use of technology still has shortcomings. Food grain, fruit, vegetable yields per acre in the nation are far below average worldwide.

Similar to this, by taking into account the seeds, soil health, pest management, crop life-saving irrigation techniques, post-harvest technology, the productivity of pulses and oilseeds can be boosted.

Numerous sorts of agriculture M-Apps, including weather apps, news apps, e-government apps, have been thoroughly discussed. The rapid yearly expansion of mobile phones is thoroughly explained by mobile architecture and trends. AgriSmart (crop information), Kisan Yojna (government programmes), Modern Kheti (literary), myRML (agriculture 182 S. Kaur and K.S. Dhindsa market) are currently the best M-Apps in India.

The finest M-Apps for agricultural marketing, government programmes, literature, soil knowledge are found to be Farm Progress, Agricultural Policy Research, Growing Organic Vegetables, MySoil in other nations. Developers consider the Arduino system to be the greatest M-App for attaching a mobile phone to a collection of sensors. According to users, AgriApp is the best software since it allows users to upload their questions along with text, images, audio, video. E-Agro and AgriApp support IVRS (a paid service). The main downsides of M-Apps are their reliance on language, static content, minimal usage of IoT, lack of online promotion. It has been discovered that the finest source for modernising agriculture is M-Apps with IoT.

By 2025, India's population is predicted to exceed 1.5 billion, making food security the most pressing societal concern. To fulfil the demands of a growing population, food production would need to be significantly boosted. Many people in rural areas live in deplorable circumstances and are socially and economically underdeveloped. Since agriculture is the main activity of people in rural regions, using technology and cutting-edge, inventive techniques and approaches will be beneficial for enhancing people's quality of life and reducing the effects of poverty. The agricultural industry employs a wide range of people and technologies, farming

practices require expertise and information on how to use them effectively.

Reference

1. Hori M, Kawashima E, Yamazaki T. Application of cloud computing to agriculture and prospects in other fields. *Fujitsu Scientific & Technical Journal* 46(4): 446-454: 2010.
2. Pocatilu P. Developing mobile learning applications for android using web services. Economic Data 14(3): 106–115, 2010. doi:10.1145/2261605.2261641.
3. Patel BV, Thakkar GR, Desai VH. An android application for farmers for kharif and rabi crop diseases information. *International Journal of Research in Computer Science and Software Engineering* 2014; 10(10): 788-791.
4. Dhaliwal KR, Joshi V. Mobile phones- boon to rural social system. *Literacy Information and Computer Education Journal* 2010; 1(4): 261–265.
5. Mondal P, Basu M, Bhadoria SBP. Critical review of precision agriculture technologies and its scope of adoption in india. *American Journal of Experimental Agriculture* 2011; 1(3): 49–68.doi:10.9734/AJEA/2011/155.
6. Karetsos, S., Costopoulou, C., Sideridis, A.: Developing a smartphone app for m- government in agriculture. Journal of Agriculture Informatics, vol. 5, no. 1, pp. 1–8, (2014). doi:10.17700/ jai.2014.5.1.129.
7. Zhu, Y., Wu, D., Li, S.: Cloud computing and agriculture development of china: theory and practice. International Journal of Computer Science Issues, vol. 10, no. 1. pp. 7–12, (2013).
8. Sandu SH, Singh G, Grover J. Analysis of kisan mobile advisory services in south western punjab. *Journal of Krishi Vigyan* 2013; 1(1): 1-4.
9. Bhave A, Joshi R, Fernandes R. Mahafarm-an android based solution for remunerative agriculture. *International Journal of Research in Advent Technology*, 2014; 2(4): 43-47.
10. Narechania A. An android-arduino system to assist farmers in agricultural operations. Proceedings of IRF International Conference, New Delhi, India, pp. 19–26, (2015).
11. Patodkar V, Simant S, Sharma S. E-Agro Android Application. *International Journal of Engineering Research and General Science* 3(3): 458–465.
12. Gao C, Yao K. The design and implementation of portable agricultural microclimate data acquisition system based on android platform. 8th International Symposium on Computational Intelligence and Design, IEEE Explore, vol. 1, pp. 210–213, (2016). doi:10. 1109/ ISCID.2015.275. 13. Telecom regulatory authority of India: Highlights of telecom subscription date as on 30th June 2015, New Delhi, India 2015; 1–19.