ISSN 2278-3091
Volume 10, No.2, March - April 2021
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse371022021.pdf
https://doi.org/10.30534/ijatcse/2021/371022021

Innovative Agricultural Information System with User Friendly Digital Assistance for Farmers

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ABSTRACT

In India, most of the populace is subordinate to cultivating for survival. Numerous farmers are not mindful of the exterior world and the specialized progressions around cultivating. They confront a parcel of issues in their day-to-day life such as they need to keep track of their trim stock, their tractors, and devices. Most of the farmers do not have any thought almost the rates of the crops and their items and they offer their items at any fetched price. In today's world, farmers get news through daily papers and television. Farmers don't get the data or news around the closest showcase that's displayed in their locale or indeed offer and track their crops. So, because of this they more often do not get any thought about the current news regarding the farming plans. In conclusion, they have to sell their products at a very low cost to a local supplier. We are looking forward to protecting these anticipating farmers from being cheated from their reasonable share of their income. These days versatile applications and web administrations are making things less difficult by satisfying our day by day needs for data, communication, amusement, or relaxation. Web applications have brought an unused insurgency.

In this paper, we offer one such web application called "Genesis - Farmers Digital Assistant" which is as of now beneath advancement by us. This web benefit can offer assistance to farmers, customers, and suppliers have a less difficult, easy-to-use, and less time-consuming solution. Farmers Digital Assistant could be a web application that's built on keeping the farmers, providers, and customers in intellect. It keeps a farmer overhauled with all the data related to crops, pesticides, bug sprays, money related segment, etc. It gives nitty gritty data about which crop to cultivate in which season and which crop is appropriate for that specific region where the farmer is situated in. The government of India is investing a lot to form the utilization of the web accommodation for agribusiness purposes but the hindrance is the literacy of farmers with their access to the advanced world presently. So, with this web application, we make it a point to create our project user-friendly for the farmers in specific.

Key words : Web Services, Assisted Living, Agriculture, Farmers, Real-Time Monitoring, Transportation, Online Retail/Shopping, Weather Forecasting

1. INTRODUCTION

India is an agricultural nation. Around seventy per cent of our populace depends on farming. One-third of our National pay comes from agribusiness. The improvement of farming has much to do with the financial welfare of our nation. Presently our nation is self-sufficient in nourishment grains. Within the up and coming a long time, agribusiness will see a noteworthy change. The tremendous larger part of Indian farmers, which incorporates small-scale producers are frequently incapable to get to the data and mechanical assets that may increment the yield and lead to way better costs for their crops and products. The information with respect to cultivating is accessible from numerous sources like printed media, sound and visual help, daily paper, television, internet, portable etc. but the groups and structures of information are dissimilar. So, it is exceptionally hard for a farmer to get the information and to understand the various information which is disseminated from different sources. Now and then numerous manual steps are required while processing information for changing information from one format to another.[1]

In India, numerous farmers are not mindful of the exterior world and specialized advancement in cultivating. Most of the farmers don't have any thought about the rates of the crops and their products and they offer them at any price. [2] This is because not every farmer has the time to study the daily paper nor to observe the television as they do not have much leisure time to sit and relax. So, because of that, they do not get any idea around the current values about the cultivating plans and in conclusion, they have to offer their items at an exceptionally lower cost. And since they get less cash, they end up taking credit from the bank or any other individual on intrigued. As the internet is the current drift in today's world, each and every domain has web-based applications. A smartphone makes all our assignments quick, effective & exact. The Internet allows current digital users to access these web applications unreservedly. Due to these features, we are creating the farmer web application for farmers to utilize to the most extreme advantage. This web application for farmers who are utilizing smartphones can get the real-time

upgrades around crops, they can even contact suppliers directly in India and they will be able to offer their products at the correct rates. Our application will provide the feature where all the farming-related tips and information from the government will be added and farmers don't need to stress about transportation or logistics. Moreover, including the feature of climate information concurring to their area will offer assistance to farmers to arrange for the following days.

The project will offer assistance to farmers to guarantee more noteworthy productivity through direct communication (farmer to supplier & farmer to farmer). The benefit this application gives will boost trade communication and brings transparency to the system. This inventive project will make a stage for a great farmer, retailer, and supplier communication. It'll permit farmers to login and communicate with their individual merchants. When merchants distribute a notice/advertisement or an offer, the particular farmers will get notified with a message. The farmers may moreover yield their grievances and complaints to their individual merchants or authorities utilizing their login credentials and the authorities will be informed of any grievances regularly. This project will comprise of fundamental features. There will be separate logins with appropriate functionality for farmers, administrators, consumers and dealers/retailers. The farmers will be provided with a separate page where they can post their complaints and as it was doled out assigned administrators/authorities can have access to examined and alter this page. There will be a page where different merchants and retailers may show their notices and get notices. [3]

The farmers will be informed of different information through messages as well as new advertisements at whatever point they are published. The web service will also provide a suitable mode of transportation for the conveyance of crops to consumers and suppliers from the farmers. Providing location-specific information delivery benefit. It will provide an interactive and easy-to-use graphical user interface for the farmers so that they will be able to form utilize this service effortlessly. This project can also be extended for a large-scale purpose which can offer assistance to numerous farmers in numerous towns to communicate and bargain with each other. The farmers will determine more prominent advantage when they can make superior choices almost where to offer their yield after getting advertise costs for an assortment of nearby and distant markets. This will be a One Stop Solution to all their agrarian information needs. This web application will have an exceedingly true and dependable database on farming.

2. OBJECTIVE

The primary objective of the venture is to interface farmers and clients across the nation over so they can get together so it will be helpful for both the parties. The goals of the undertaking are:

◦To present the idea of computerized showcasing in the field of agribusiness by attempting to wipe out the job of mediators or intermediaries from using their influence to guarantee reasonable cost to farmers.

◦To make a web administration that can help farmers, buyers, and providers have a less complex, simple to-utilize, and less tedious arrangement.

◦To keeps a farmer refreshed with all the data identified with crops, pesticides, insect poisons, monetary area, and so forth.

◦To give point by point data about which harvest to fill in which season and which yield is appropriate for that specific zone in which the farmer is living. The public authority of India responsible for agriculture is spending a ton to utilize the web supportive for agribusiness purposes however the prevention is the proficiency of farmers with their admittance to the computerized world now, so with this web application, we plan to make it easy to use for the them specifically.

◦To deal with the transportation administrations of these items to the purchasers and providers.

◦To improve effectiveness of the framework, multi-even handed and appropriate associations that should be routed to create ideal outcomes.

3. PROBLEM STATEMENT

Many of the already existing services or previously made apps and solutions were proposed to provide an online platform for consumers mostly and not mainly for farmers. The apps either had bugs and issues with it. It wasn't user friendly. Some of these solutions only took up space on the devices and weren't useful. Not enough information and services keeping the farmers in mind. There aren't platforms for farmers to express their concerns and grievances. The farmers were being cheated their fair share of the revenue too. [4]

The concept of digital marketing in the field of agriculture should be introduced by trying to eliminate the role of middlemen or intermediaries from agricultural marketing in order to insure fair price to farmers. The new solution that is required is a web application that is built keeping the farmers, suppliers, and consumers in mind. A web service that would keep farmers updated with all the information related to the crops, pesticides and the latest technology used in agriculture. A platform for consumers and suppliers to directly interact with farmers. A user-friendly platform for the farmers in particular. A platform for farmers to express their concerns and grievances. A solution that takes lesser time and that comes with a low cost.

In table 1, we have listed all the different already existing applications and solutions. We have gathered the various information related to the applications. And found out the advantages as well as the disadvantages of these applications. Now it is easy to see the clear picture and the problems that are faced by users especially farmers in the already existing applications. A solution to curb all these and provide the best experience for farmers is necessary at this present day and age. A more digital and feasible option needs to be provided for our farmers.

4. LITERATURE SURVEY

Table 1: Literature Survey Table

Sl. No.	Existing Apps	Creators	Methodology	Year of Publication	Advantages	Disadvantages
1.	Iffco Kisan App	Star Global Resources, Bharti Airtel	It is one of the pioneering mobile data driven services in India, providing a 'one stop shop' information portal with access to agriculture content. It aims to help Indian farmers make informed decisions through customized information related to their needs.	2015	1. gives easy interface 2. gives diverse information to farmers like latest mandi prices, latest agriculture advice, farming tips to make farming easy 3. provides agriculture alerts to farmers in different Indian languages	1. very heavy app 2. it is very buggy and shows errors 3. very slow to load any page 4. missing few of the states
2.	Rabi Season Farmer App	Government of Karnataka	The vision of the project is to be the means to create one single, verified source of truth for Farmer and crop data in the state.	2020	1.provides agriculture alerts to farmers in different Indian languages 2.they do update it 3.keeps record in Parihara, RTC, etc	1.bugs are still there (doesn't take picture) 2.not receiving the OTP 3.Aadhar mismatch problem 4.not so user friendly
3.	Krishi Network	Ashish Mishra, Siddhant Bhomia	it's an effort to increase farmer's income by connecting the Indian Farmers to progressive farming and market access via internet. Experts from agriculture departments providing fasal salah(Krishi Advisory) and information about growing dhan(paddy), and plant protection using carbendazim fugicide, smart farming techniques and info on latest smart farming techniques.	2018	1.very user friendly 2.access to all knowledge about agriculture 3.shows weather and contains certain unique features	1.needs more optimization 2. there are a few bugs present 3.sometimes slow to load certain pages
4.	AgriApp	AgriApp	AgriApp is an Android based mobile application. It provides complete information on Crop Production, Crop Protection, smart farming with agriculture and allied services. In addition to being an information portal, AgriApp is also an online market place for bringing in farmers, Agri input, retailers & fulfilment services on a common digital platform.	2014	1.easy to use 2.sells necessary farming and crop requirements 3.good for farmers to know more about crops	1.sometimes fails to log in 2.customer care section isn't good 3.delay in loading some pages 4. lots of advertisements
5.	Pioneer Farmer Connect	PHI Seeds Private Limited	Pioneer Farmers can choose their Pioneer Hybrids, purchase, make payment and receive their products at their doorstep. They can also subscribe to crop advisory services from Pioneer for the chosen hybrid.	2017	1.displays optimal weather 2.can input a lot of detailed crop details	1.bugs are present 2.not logging in 3.connection error keeps on popping up 4.not user friendly
6.	Agriculture & Pashu Mela App for Farmers	Farmstock Technologies	Krishify agriculture app is a community for farmers (kisan) where they can discuss their crop issues, seeds and agriculture equipment, pm kisan yojana by GOI, etc. with fellow farmers & experts.	2019	1. enable farmers to access government information 2. transact with public agencies at their convenience 3.can buy and sell used tractors	1.app is only in Hindi 2.not giving any reply or solutions to queries 3.not user friendly
7.	Farmers Livestock India	NJ Tech Developers	It is one of the pioneering mobile data driven services in India, providing a 'one stop shop' information portal with access to agriculture content. It aims to help Indian farmers make informed decisions through customized information related to their needs.	2020	1.no mediator process 2.easy for farmers to use 3.good for small scale farming	1.Rates were not visible at times 2.a few bugs were present 3.the contact information provided were bogus 4. lots of advertisements

8.	Farmers e-market	Vcode Infotech Limited	A farmer or public can use it for buying or selling their agricultural products, animals, Poultry, fishes, Diary and other farm products, nursery and gardening items etc and etc. It is a good platform for those who want to sell and buy used vehicles, Agricultural machinery, Farmers Inventions, Seeds, Flowers, Birds, and Home made products.	2017	1.we can buy and sell our products	1.Not user friendly 2.Login wasn't working 3. bugs are present 4.no proper communication 5.not feasible for farmers 6.lots of advertisements
9.	REACH- India Farmer App	ADAMA	REACH is an Android based mobile application. It provides complete information on Crop Production, Crop Protection, smart farming with agriculture and allied services. In addition to being an information portal, REACH is also an online market place for bringing in farmers, Agri input, retailers & fulfilment services on a common digital platform.	2019	1.user friendly 2.very informative 3.contains weather updates etc 4.has different languages	1.stopped providing updates 2. lots of advertisements 3. a bit heavy app
10.	FarmBee	Sweetchillie Technologies	We can see key data with respect to your farm such as weather, daily price of the crop for your farm. You will also get complete solutions for farm management on pests, disease, nutrition, agronomy, and irrigation management. Get intelligence and analysis gathered over thousands of similar farms at your fingertips and start your precision digital agriculture practice.	2014	1.very light app 2.GUI looks alright	1.stopped providing updates 2.no weather forecasting or locations being used 3.market information not provided 4.sign up/log in errors

5. RELATED WORK

There are numerous online web applications as well as android applications that are based on a comparable thought. But most of their conclusions end up including dealers as one of the intermediates that are once more beginning the circuitous deals chain of the supply of items. [5]

Iffco Kisan App - Star Global Resources, Bharti Airtel (2015): It is one of the spearheading mobile information driven administrations in India, giving a 'one stop shop' information portal with access to agriculture content. It points to assist Indian farmers make educated choices through customized information related to their needs. It provides a simple interface, gives assorted information to farmers like latest mandi costs, most recent farming exhortation, cultivating tips to make cultivating simple. It too gives farming alerts to farmers in different Indian dialects. Its drawbacks incorporate, an overwhelmingly heavy application, it is buggy and shows errors, very moderate to load any page. [6]

Rabi Season Farmer App - Government of Karnataka (2020): The vision of the project is to be the means to form one single, verified source of truth for Farmers and crop information within the state. It provides agribusiness alerts to farmers in different Indian dialects, they do upgrade the application and keeps record in Parihara, RTC, etc. Its drawbacks incorporate, not so user-friendly, bugs are still there (doesn't take picture), not receiving the OTP, Aadhar jumble issue. [7]

Krishi Network - Ashish Mishra, Siddhant Bhomia (2018): It's an exertion to extend farmer's pay by interfacing the Indian Farmers to dynamic cultivating and market access through web. Specialists from agribusiness offices giving fasal salah (Krishi Advisory) and information about cultivating dhan (paddy), and plant protection utilizing carbendazim fungicide, shrewd cultivating procedures and information on most recent smart cultivating technique. It is exceptionally user-friendly, has access to all information about agribusiness, shows weather and contains certain interesting features. Its impediments incorporate, it needs more optimization, there are many bugs present, now and then moderate to load certain pages. [8]

AgriApp – AgriApp (2014): AgriApp is an Android based mobile application. It provides complete information on Crop Production, Crop Protection, smart cultivating with agribusiness and associated administrations. In expansion to being an information portal, AgriApp is additionally a web advertise put for bringing in farmers, Agri input, retailers & satisfaction services on a common computerized stage. It is

simple to utilize, offers essential cultivating and crop prerequisites, great for farmers to know more about crops. Its drawbacks incorporate, some of the time falls flat to log in, customer care section isn't great, delay in loading a few pages, lots of promotions. [9]

Pioneer Farmer Connect - PHI Seeds Private Limited (2017): Pioneer Farmers can select their Pioneer Hybrids, buy, make the instalment and get their items at their doorstep. They can moreover subscribe to crop advisory services from Pioneer for the chosen hybrid. It shows ideal climate forecasting, can input a lot of detailed crop points of interest. Its impediments incorporate, not user-friendly, bugs are present, not logging in, connection errors keep on popping up. [10]

Agriculture & Pashu Mela App for Farmers - Farmstock Technologies (2019): It is a community for farmers (kisan) where they can discuss about their crop issues, seeds and agriculture equipment, pm kisan yojana by GOI, etc. with individual farmers & specialists. It empowers farmers to access government information, transact with public agencies at their comfort, can purchase and sell utilized tractors. Its impediments incorporate, application is only available in Hindi language, not user-friendly, not giving any answer or arrangements to questions. [11]

Farmers Livestock India - NJ Tech Developers (2020): It is one of the pioneering mobile information driven services in India, providing a 'one stop shop' information portal with access to agribusiness content. It points to assist Indian farmers make educated choices through customized information related to their needs. There's no mediator process, it is simple for farmers to utilize, great for small scale cultivating. Its drawbacks include, rates were not visible at times, a number of bugs are present, the contact information given were fake, lots of promotions. [12]

Farmers e-market - Vcode Infotech Limited (2017): A farmer or public can utilize it for buying or selling their agrarian products, animals, poultry, fishes, diary and other farming products, nursery and gardening products, etc. It may be a great stage for those who want to sell and purchase utilized vehicles, agriculture machinery, Farmers Innovations, Seeds, Flowers, Birds, and Home-made products. It provides a platform to purchase and sell agricultural products. Its drawbacks incorporate, not user-friendly, login process doesn't work, bugs are present, no legitimate communication, not feasible for farmers, lots of advertisements. [13]

REACH- India Farmer App – ADAMA (2019): REACH is an Android based mobile application. It gives total information on Crop Production, Crop Protection, keen cultivating with agriculture and associated services. In expansion to being an information portal, REACH is additionally a web showcase put for bringing in farmers, Agri input, retailers & satisfaction services on a common computerized platform. It is user friendly, very instructive, contains climate updates, is accessible in several dialects. Its drawbacks incorporate, it ceased giving upgrades, has lots of advertisements, a bit overwhelming application. [14]

FarmBee - Sweetchillie Technologies (2014): We can see key information with regard to cultivating such as weather, daily cost of the crop for cultivation. You will also get complete solutions for cultivate management on pests, diseases, sustenance, agronomy, and water system administration. Get insights and examination assembled over thousands of similar farms at your fingertips and begin your exactness computerized farming practice. It is a very light application, GUI looks okay. Its drawbacks incorporate, it ceased giving updates, no climate determining or locations being utilized, market information not provided, sign up/log in errors. [15]

6. PROPOSED WORK

The proposed framework overcomes all the drawbacks and is useful to the farmers as well as clients. Web applications have revolutionized the complete world in different sectors. [16] The proposed framework brings the web platform into the domain of agriculture to assist agriculturists. By giving all the data that's ever fundamental, at the comfort of a single button, it is exceptionally simple to utilize. Considering the rate of uneducated clients, the user-friendly UI is unquestionably a reward. Those agriculturists or farmers who cannot read or write and type in, can just press a single button and ask for the data required. The major highlight of this proposition is that all the specified highlights and availability alternatives are accessible at a really low fetched price for the farmers to facilitate their utilization. The database is routinely overhauled and comprises of most recent and exact data to assist the agriculturists. The proposed system within the frame of a web application can be effortlessly gotten to on smartphone of any kind and through all portable web services as well. There's a huge contrast within the benefit edge when this application is used and when not. Through this application, we accomplish our fundamental objective, which is to extend the benefit margin of the farmers and make beyond any doubt that they get the correct cost for their endeavours. Within the nonattendance of an intermediary coordinate to connect with the buyers, the farmers are at the leniency of the intermediaries who involve the complete space between the generation and the extreme deal of the deliver. This makes farmers frequently discover themselves at a drawback in spite of being the makers. [17] The production network chain for farming is functioned as follows:

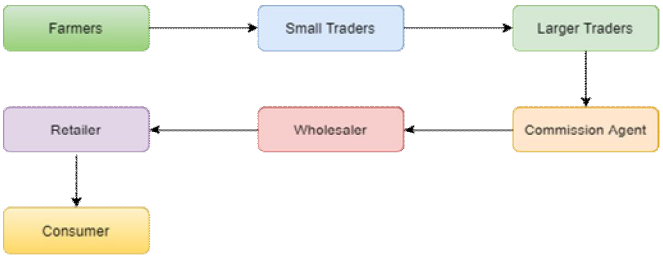

Figure 1: Typical Supply Chain for Agriculture

The following graph clearly indicates difference in prices through intermediaries and through our web service.

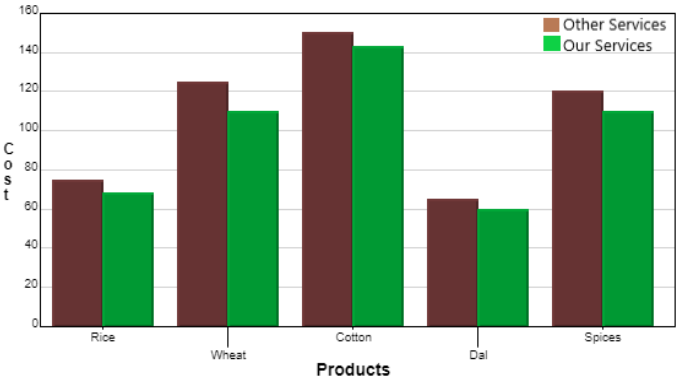

Figure 2: Prices of Crops through Intermediaries Vs Our Web Service

Our web service will have a faster response time compared to the apps and service that are already existing. We will be providing a user-friendly UI for all the users. Our data fetching and accuracy is immensely looked into. We make sure our web application contains none to minimal bugs. Since it is a web service, the users would not be required for any downloading of the program or application and it won't be using up the storage on the devices. [18]

7. ARCHITECTURE DIAGRAMS

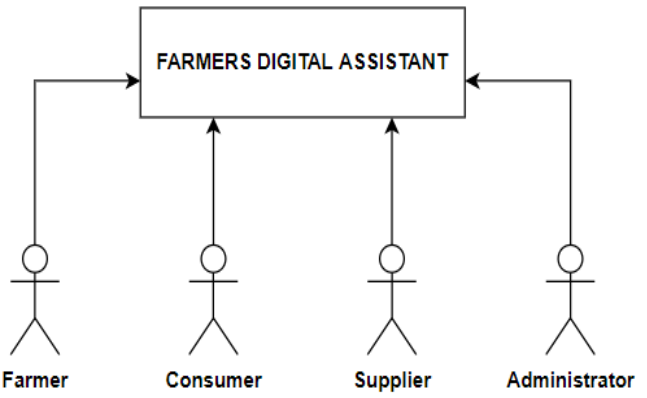

Figure 3: Our Four Main Users

A new farmer has got to sign-up to be able to utilize this web service. After which they can log-in to be able to utilize the different functionalities accessible. They can provide their crop details which they want to sell. They can also check as of now available stocks provided by other farmers in case, they want to purchase their crops. The same also applies for the various farming tools. With the crop details provided, the consumers can make direct purchases from the respective farmers. The suppliers however may make a request of the specific crop they require which a farmer cultivates. The farmers can moreover submit their grievances and complaints regarding the various issues they deal with in their day-to-day agricultural practice, or with any issues with the web service, which the administrators can look into and provide the necessary response. They can as well look into the various information on crops, like farming tips, weather, crop calendar, crop protection, etc.

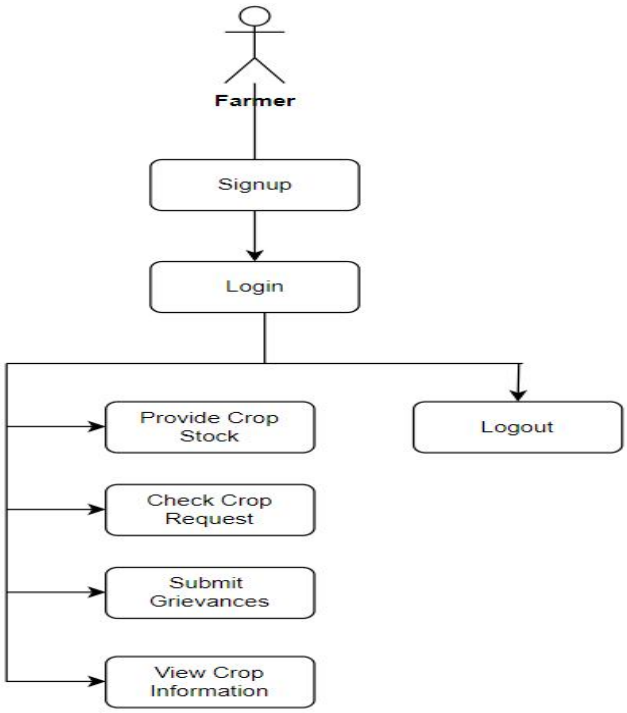

Figure 4: Flowchart of how the Farmer uses the System

The consumers have to sign-up in order to be able to utilize the web service. After which they can access the various functionalities. They can view the various crop details provided by the different farmers and make a purchase which they might be interested in. Once they place an order, they will be provided with the farmer's details which they can contact for further enquiry. On confirmation, the transportation service will be provided by the system administrator for the crops being purchased.

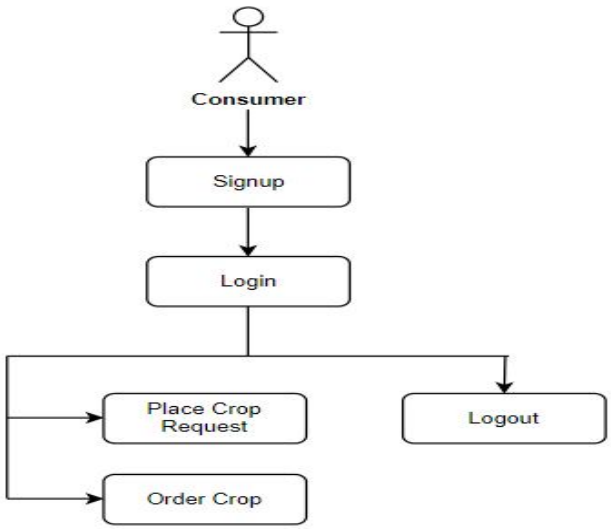

Figure 5: Flowchart of how the Consumer uses the System

The suppliers have to sign-up in order to be able to utilize the web service. After which they can access the various functionalities. They can make a request of a specific or various kind of crops to the numerous farmers which are available, which they might be interested in. The contact details will be provided where they can communicate for further enquiry. On confirmation, the transportation service will be provided by the system administrator for the crops being purchased.

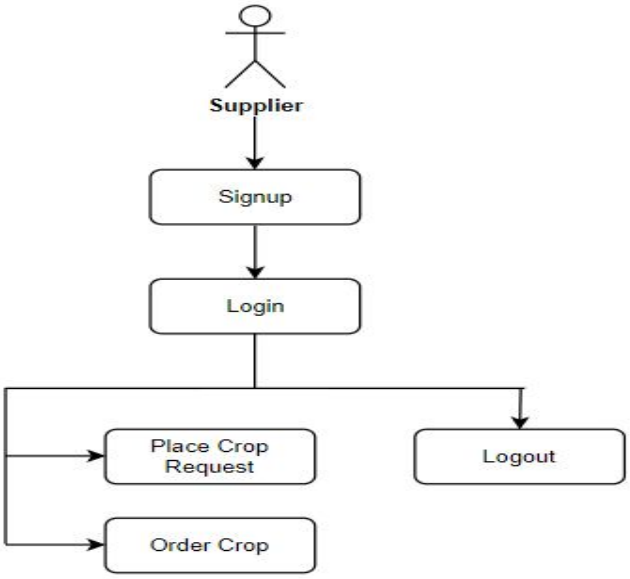

Figure 6: Flowchart of how the Supplier uses the System

The administrators require only to login, to frequently maintain the web service and provide the respective services to the respective users. The admins can look over the farmers', consumers' and suppliers' information details. They monitor

8. USECASE ANALYSIS

the activity of each user, providing the connection between farmers, between a farmer and a supplier and between a farmer and a consumer. They assure that the data in the various tables and databases are updated with real-time data. They also look into the various grievances from the farmers and resolve them. They also update the information in the web service regularly when available. Moreover, transportation services for the various transactions or purchases made by the consumers as well as suppliers are provided.

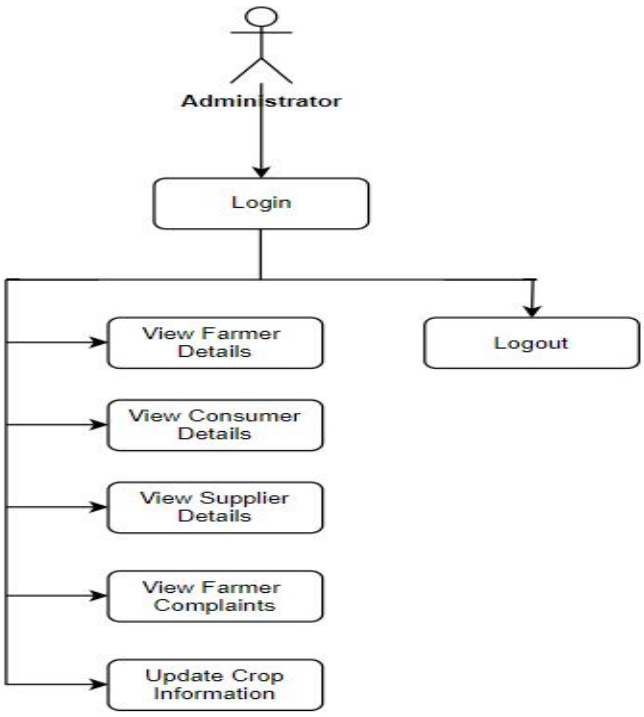

Figure 7: Flowchart of how the Administrator uses the System

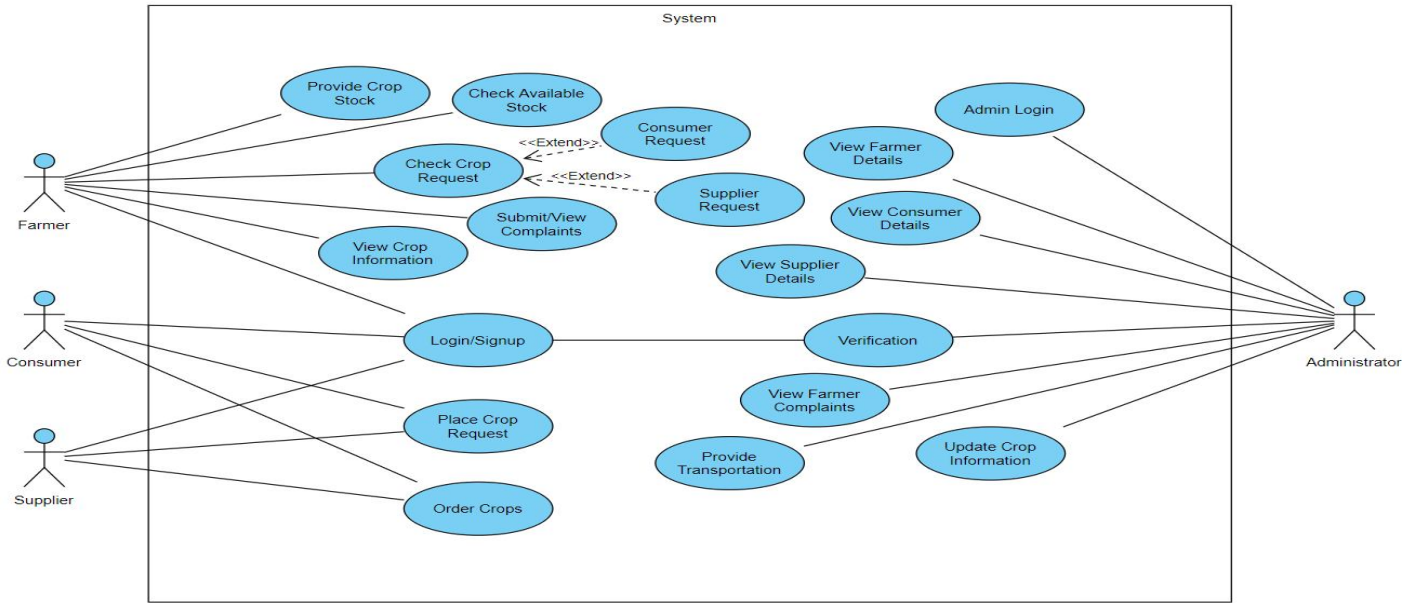

Figure 8: Use Case Diagram of the Web Service

9. PERFORMANCE PARAMETER

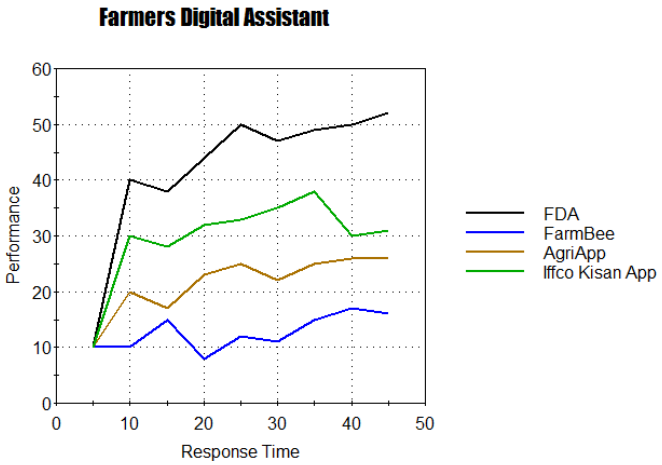

Figure 9: Performance Graph of our project Vs the existing solutions

The Farmers Digital Assistant project has shown major and significant factors that distinguishes it from the already existing web services and applications. Figure 9 shows the performance difference between the various other already existing apps vs our project. [19] The response time is faster and a major plus. User-friendly UI for all the users especially for the farmers. Data fetching and accuracy is immensely looked into. Minimal Bugs are found with our service throughout. It can further be implemented with secure payment and transaction features. Since this is a web service, users are not required to download anything to use our services and it also eliminates using up the storage on the devices. [20]

10. CONCLUSION

Nowadays portable gadgets are utilized regularly by everybody including agriculturists and farmland individuals. This application can be used for the utilization of farmers includes complex frameworks. In spite of this, the yield can be of the form and organize that's both effectively available and reasonable. This venture shapes the bridge between innovation and agribusiness. The progress of giving most recent logical progressions to agriculturists is fulfilled to this extend. This web application will define the vital method and demonstrate to make the farmers mindful about modern different information and providing approximately farming tips additionally, offer assistance to them to make strides in the horticulture sector of our country. The recipients stand the chance of improving their yield and benefits.

Farmers are in require of the logical and innovative bolster for giving the ever-growing populace with nourishment. This extends makes utilize of the proficient web benefit stage that's adaptable to the determinations and prerequisites of the smartphone and web administrations. The paper talks about the extent to which we can offer assistance to the farmers to sell or offer their items specifically without intermediates. The site will too be facilitated universally which can be gotten to by anyone so that it can be of more assistance to the country. In the event that this benefit is conveyed and made utilized by the agriculturists, at that point the production rate and economy benefits are anticipated to extend by 8% than when cultivating is done without making use of or executing any technology.

Future upgrades or enhancements can be made within the handle of improvement that will make utilize of AI and machine learning for optimal usage. Different information mining methods can be executed on the input information to survey the finest performance-yielding strategy. The site can be made more vigorous in order to arrange and decrease the server-side load.

ACKNOWLEDGEMENT

We thank our guide Dr. M. Roshni Thanka for her immense support and coordination. We thank our Institution for giving all assets required by us in time. We thank the Almighty for blessing us and giving us this chance of completing this paper. We also provide ardent wishes for all those who had offered assistance for us in completing this paper and project efficiently.

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