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Abstract: India is well known for farming. We call farmers the backbone of India, where more than 42% of the population is involved in farming. The worst part is that even though there are many farmers who are genuinely carrying on farming, they are landing up with many problems that are affecting them in many ways. The main problem is that they are suffering to get back at least the investment that they have made on their crops. This problem is caused by the huge chain of middlemen that exists along the way the products reach the customer's hand. Not only this problem, we also have some others that we have noticed. Say, if a farmer has better farming skills but he doesn't own land, in this situation, how can he be able to earn much income? Also, say that a farmer has a plot of land but he doesn't have farming tools and machinery. In this case, how will he be helped? Coming towards traders, we all know that even traders have to pay tax to APMCs for buying crops. This has made the price increase for the end customers. So, we have planned to help even traders and make their job easy. These problems are being solved by developing a mobile application.

Keywords: Farmers; APMCs; Local trader; Employment; Machineries

I. INTRODUCTION

Farmers are the ones who actually put in their efforts in order to grow crops and make them available to other people all over the world. Exporting farm products has become very popular and helpful, because of which farmers can earn more income. But not all farmers are well educated in the sense that many are illiterates, but nowadays we can see people who are educated choosing farming as their profession because they know how to achieve a better income from farming. However, many people are still unaware of the technologies that are available to make farming simpler and easier. We attempted to address some of the issues that farmers have been dealing with and suffering from for years.

One of the problems that we are focusing on is breaking the chain of middlemen. In this sector, we have majorly concentrated on the removal of APMCs. APMCs are the ones where farmers usually take their crops to sell them to traders or end customers. Wherein farmers have to pay tax in order to sell their crops, and also the trader, if he wants to buy the crop, has to pay the tax twice, because of which the traders will buy the products at a low cost from the farmers and sell them at a high cost to end-customers. But our idea is to completely remove APMC. Wherein we have the intention of not connecting the farmer directly to the end-customer but to a local trader. This is because a farmer can sell his products to a local trader at a good price without needing to pay any tax. If the local trader is in his nearest location, he can actually deliver the product on his own with no transportation cost incurred for him, but he can charge it to the trader as an additional cost. The other problem that we have concentrated on is that of providing employment opportunities for farmers. In this case, if a farmer requires 10 labourers to work on crop cultivation, he can post this need for labour, and any interested farmer can book his availability and go work for that farmer. As a result, a farmer can work for one or more farmers on a daily basis and earn money. The problem that we have focused on is that, say, if the farmer requires tools and machinery for his farming needs, he can actually book the tools or machinery that other farmers have uploaded on our application. From the trader's point of view, the treaders can actually book the products that the farmer has uploaded here. The trader can also look into the exact location of the farmer so that he can book it as soon as possible to avoid transportation costs.

II. METHODOLOGY

We have seen the problems that farmers are facing and analysed what could be the solution to those problems. After looking at many factors, we have decided to develop an android application where all the problems and solutions to those mentioned in (I) are implemented.
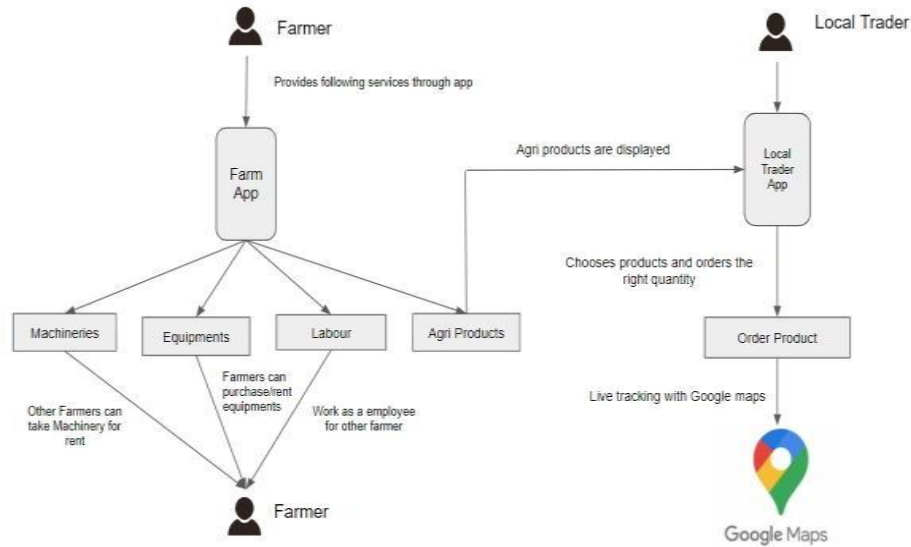
Fig 1.   Application overview

Here in the above figure, you can see that we have two different parts that we have divided into. One is a farmer and the other is a local trader. The farmer is going to login to the farmers' application and the local trader will login to his respective application. When it comes to the farmer, when he logins he can actually see the options such as to view, upload, or book machineries, equipment, labour requirements, and can specifically upload his agricultural products. The farmer himself cannot book any products that he has uploaded, as this option is not available in the farmer's application. The data that is uploaded by the farmer in each of his sections is directly uploaded to the firebase firestore[12]. Data is retrieved for the section's machinery, equipment, and labour, but not products.

Here comes the local trader application. Here, the local trader can actually view all the products that have been uploaded by the farmer and can view individual products. Before even booking them, he can view the map to visualise the exact location of the farmer, which helps for faster and easier delivery or pickup of products. Then, once the product is booked, the local trader can view the booking details in my bookings section, and the booking details will also be made visible to the farmer in his farmer application.

There are some of the constraints that are applied specifically to the local trader section, which include such things as the local trader can actually book a quantity of no less than 20 kg, below which a warning message will be thrown out to him, and if the product quantity is less than 20 kg, that product is disabled and when a trader tries to book it, it shows it cannot be booked as he cannot buy less than 20 kg. These conditions are also implied in farmers' applications for various sections where applicable.
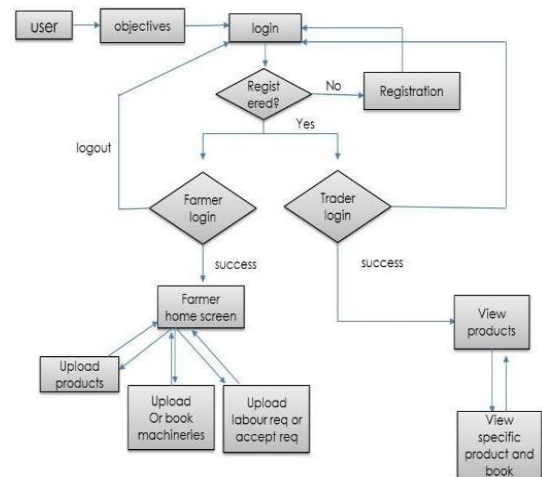
III. FLOW CHART

Fig 2.   Flowchart

A flowchart is a type of diagram that represents a workflow or process. It is a visualisation of a sequence of actions, movements within a system, and or decision points. Flow diagrams, also known as flow charts, are powerful tools for optimising the paths (or flows) of people, objects, or information through a system or procedure. In the flow chart, the user opens the app and the objectives screen is made visible to all users. Next, the user logs in or signs up to the application with his credentials. If the user is already registered, he can choose the farmer or trader option. If not, it returns back to the login form and asks you to sign up for an app. The farmer or trader logs out of the application after his process is completed. Once the farmer's login is successful, he can view the home screen with four modules available where he can choose to upload the products, upload and book machinery and equipment, and also upload and accept

labour requirements. Once the trader's login is successful, he can view and book the required product.

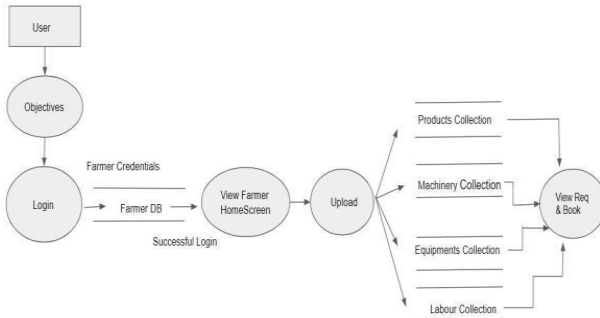## IV. DATAFLOW

A. *Dataflow in farmer application*

Fig 3.   Farmer application dataflow

In the data flow diagram of farmer, usually when the farmer logs in to the application using his credentials, the credentials entered by the farmer gets verified in the farmer collection of firestore database[11]. Then after which he is taken to the respective farmer home screen only after successful login. Then he will be given many different options to choose such as uploading the products, uploading the machineries for rent, uploading the equipment for rent or selling, and finally he can upload the labour requirement or book himself to become a labour. Once the farmer choses to upload a product, he enters all the details asked in the application. These details will be uploaded to products collections. Similarly if the farmer wants to upload the machinery for rent the details of the machinery will be pushed onto Machineries collections and these machineries mare made visible to other farmer for booking. Once the farmer books the machinery the data will be uploaded to my machinery's sections. These things are same for equipment section and also for the labour section.
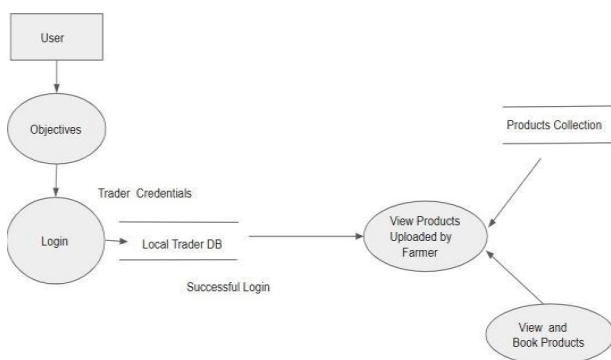
B. *Data flow in trader application*

Fig 4.   Trader application dataflow

Coming to data flow in trader application, here also the same scenario wherein the trader enters his credentials and the credentials gets verified from firebase forestore

[13]. Upon successful login he will be navigated or taken to trader home page. In this home from the products collection the data is being retrieved and displayed to the trader, The trader can then view the individual product including their maps where in the coordinates are mapped fetched from the farmer collection for visualizing the exact location for booking the product. Then once the product is booked these details are sent to my booking's collections in firestore.

V. RESULTS
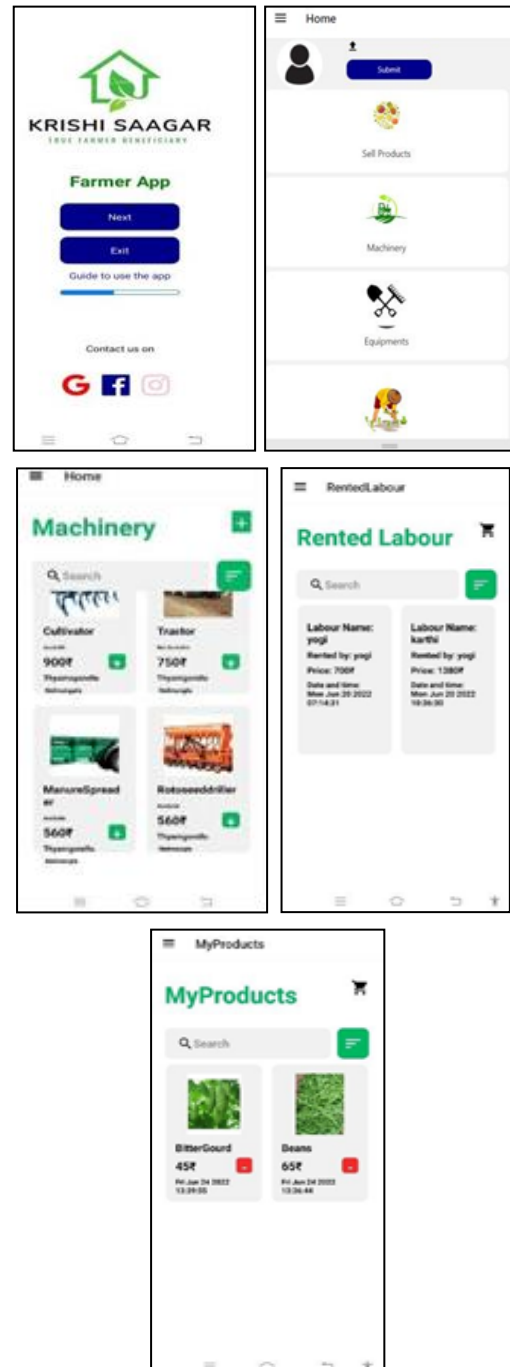
A. *Farmer Application*

Fig 5.   Screenshots of farmer app
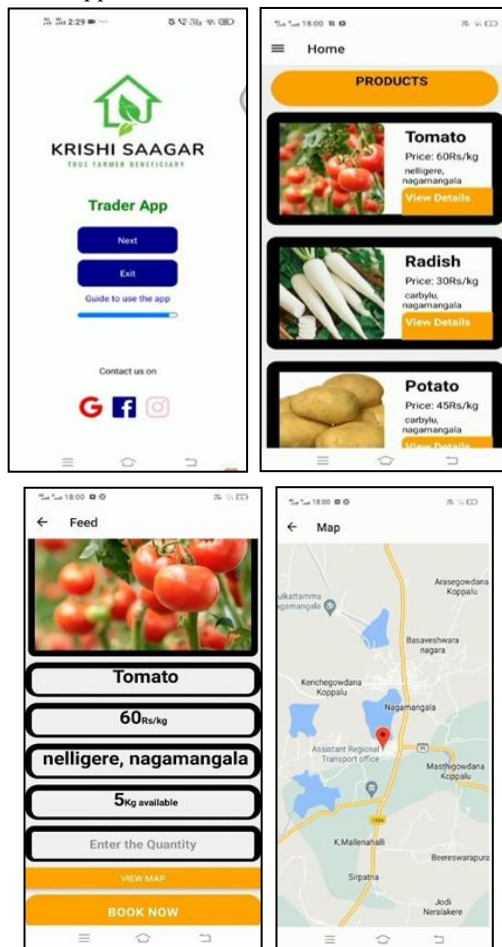
B. Trader Application

Fig 6.   Screenshots of trader app

VI. CONCLUSION

The application that we have developed has many advantages to farmers which can actually bring out new changes that make things effective. The problems that we had focused during the beginning of this project were successfully implemented. This application not only focuses on problems that are faced by farmers but also looked into local traders too. Where the chain of middleman is just broken for some extent and joined by removing that broken section. During this process of implementation, we had learnt a lot about the technology of implementation, planning, execution, and other aspects.

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