AGRIPRENEUR: A MOTIVATIONAL APPLICATION TO GENERATE ENTREPRENEURS.

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AGRIPRENEUR: A MOTIVATIONAL APPLICATION TO GENERATE BUSINESSMEN AND ENTREPRENEURS

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Dissertation submitted in partial fulfillment of the requirements for the Bachelor of Science Specialization in Software engineering

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Declaration of the candidate and Supervisor

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate is carrying out research for the undergraduate Dissertation under my supervision.

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Signature of co-supervisor: _____ Date: _____

(Janani Tharmaseelan)

ABSTRACT

In past years, if a person wants to become entrepreneur it seems very difficult and hard because of lack of resources and knowledge but in new era entrepreneur can found resources but anyhow still it seems difficult to find proper resources related to agriculture specially in a country like Sri Lanka. Even if there are resources the people who got the advantage is less amount though they have full of space around their house. Furthermore, In Sri Lanka, people especially afraid of failing when it is an innovation because there is lack of guidance. People would not have inclined to grow different crops unless they are encouraged, motivated to do so. As a member intend to get more participants to research for make the platform bigger and to make more entrepreneurs

Moving on, this proposed Application provide any individual or family to become proper green entrepreneurs through a proper motivational aspect where user can be stable in financial even in bad situations. Suggested Application Provides a gamification model to more addict the user through human computer interaction to the Application which also include the reward model which provide a discount on the of purchasing the Application. It includes attractive UI, animations along with IOT components which are combined with the psychological aspects of motivated. Application encompasses with a regional leaderboard which show user the other user earned values who are in the same area. it drives the users to gain more profit by motivating user.

Key words: *Motivation, Entrepreneur Agriculture, Gamification, Psychology, IUP, Agripreneur*

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Abbreviation	Description
FE	Frontend
BE	Backend
GDP	Gross Domestic Products

1. INTRODUCTION

1.1 Background

Economy is one of most important factors when it comes to stability of individual or family. Sri Lanka is a country where people have good agricultural Sanskrit. They can be Economically stable even if they have small amount of space in their garden by managing the spaces wisely while other waste their large amount of space. When country is in bad situation it is possible to sustain by managing the space of their garden. In order to get the best results out of their space they need some motivations which is lack in the country. According to the survey, The GDP growth of agricultural of Sri Lanka will be shown in here which is from CBSL [pic of decreasing]

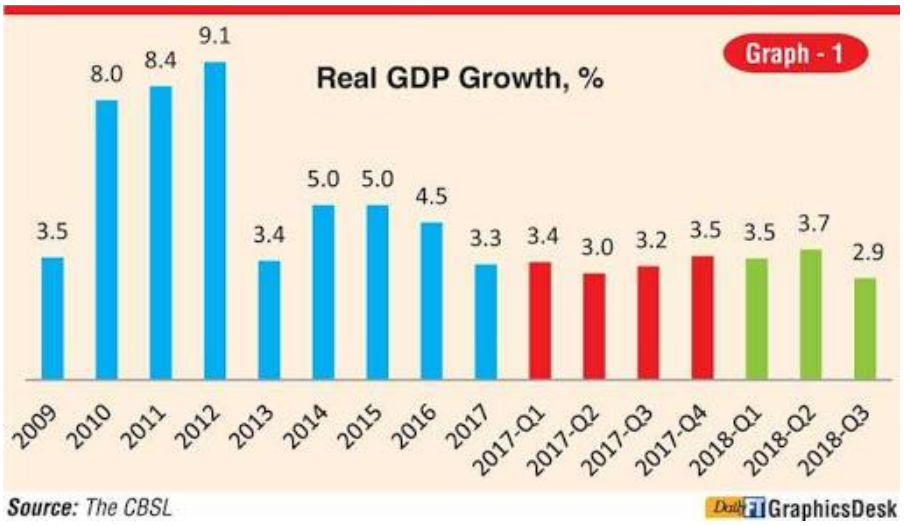

Figure 1.1.1 - Real GDP growth of Agriculture of Sri Lanka

In this graph it illustrates that the growth of GDP of agriculture decreased in years from 2009 to 2018.

In the internet there are motivational research papers can be found which gave good explanations about motivation for agriculture as well as bad. Some papers show it without consider the psychological factors or does not give proper results quite well. Almost all of papers illustrate that attitude of an individuals or family together can

make a big difference. It also shows that attitude difference from regions, gender, age, believes, social pressure, knowledge and many more. Data sets gathered in different methodologies in different regions. in our application, data gathered conduction online form survey and results showed up like this.

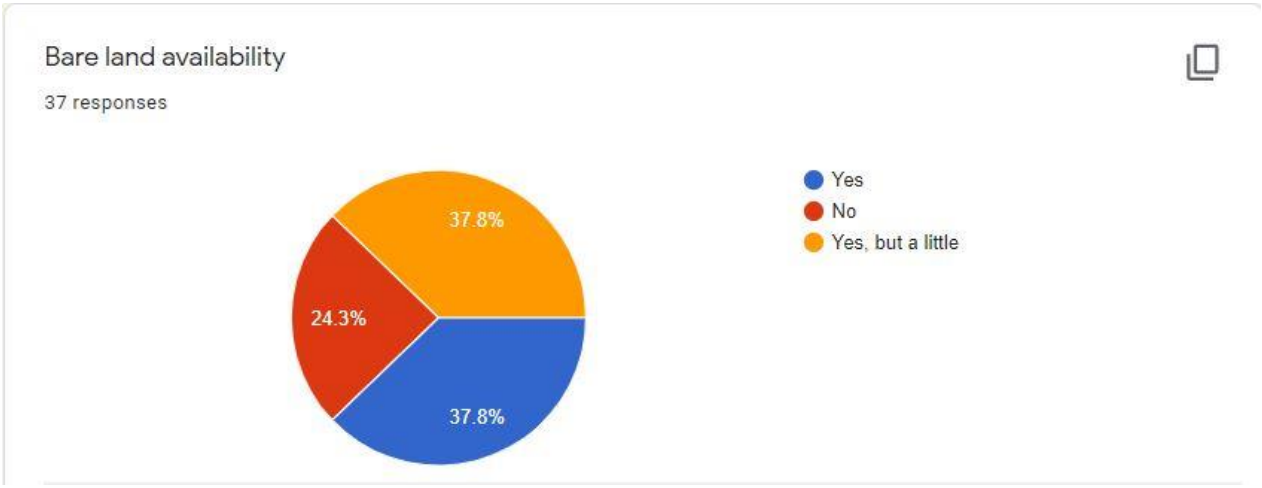

Figure 1.1.2 – Bare Land Availability

Above graph describes the Bare land Availability of the survey. It shows that the smaller number of people does have small amount of space to grow the crops.

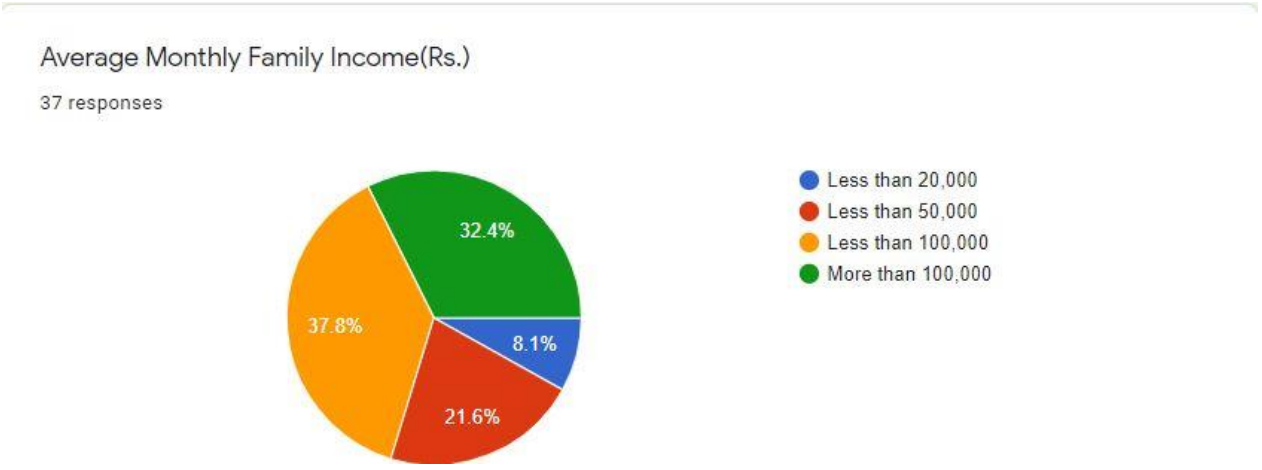

Figure 1.1.3 – Average Monthly Family Income

This graph shows that the average monthly family income of the survey. Which illustrate that the most of participants have monthly income of less than 100,000 which means that most people have some of considerable sustainable salary.

Furthermore, in our research members engaged more with psychology aspects with motivations and represent it to user with different technological based methodologies. The application is a mobile Application using react native as FE and python as BE with Restful services. which motivated and engaged users to the system more and through the flow they will motivated to grow the crops and earned money which they will be sustain.
The following parts of the papers will discuss the literature review, research problem, research gap and the other main points want to make attention

The following section of this report is explaining the literature review of the related researches, research gap and research problems, methodology of the project and the conclusion part which will conclude overall work planning.

1.2 Literature Survey

By reviewing other research papers can acquire more knowledge about the similar functionalities and technologies. Those are knowledge about the research problem, impacts of them and how well they tackled them.

Following Research paper, [1]. Which is about cereal based farming system in Ghana. Research paper shows that motivation of farmers in Ghana depends on three sustainable intensification practices which are improved maize verities, cropping system strategies and both together also include depends on personal satisfaction, eco-diversity and eco-efficiency which are differed in regions. They clearly mention the regions directly effects the farmers to motivate to grow crops by representing graphs and percentage values of different regions calculated using different equations. Paper

mention that lack of social support, climate changes, risk and uncertainty, policies and regulations are some facts that occurred in Ghana to demotivate people in Ghana. Some of farmers focused about the crop diversity, nutritional benefits they gathered, some focused about the self-efficiency rather than economics.

Following research [2] conduct in 2013 with people who are farmers involved in pasta supply chain. To evaluate farmers' intention and implements of sustainability of approaches related to ecological area with wheat crops according to the agricultural policies and it shows that farmers have low level of knowledge of common agricultural policy when conducting questionnaire. farmers' attitude directly impacts the sustainable ecological area with data set collected from survey in Italy. Somehow some farmers do not believe that agricultural policies will not make any difference at all which represent in graphs and tables. They have used statistical technological approach which used different methodologies to conduct research

When consider the psychological aspects of people related to agriculture it shows that the motivation depends on the gender as well. Which is properly shows in This research paper [3] it shows that female farmers more motivated for quality seed than male farmers this consider under six attributes ''good taste,'' ''drought tolerance,'' ''long shelf life,'' ''resistance to diseases,'' ''big tubers,'' and ''high yield.'' Papers also mention that female users are not mentally inclined to waste the money for family purposes they are enjoyed when they eat. When it comes to male farmers, they consider the early maturity as a key characteristic when selecting quality seeds. Research conduct potato farmers in six districts in Kenya with different methodologies including interviews

When it comes to gamification, there on the internet a smaller number of researches can be found. Somehow there is a huge impact for user when using a gamification model-based approach. But in following paper [4] didn't clearly say that its success or fail it mention that success partially. Papers is conduct in Indonesia in rural areas. The

purpose of the paper is to increase communication and farmers to motivated to engaged more in agriculture because the population for agriculture area drastically reduced. They have conduct using methodological way but didn't mention the percentages of participants or the results. They mention represent graphs including gaming elements and UI but in general way hoping to engage more users to the system. They mention they have included leaderboard and reward setup for the Application to engage more users. Which leaderboard show people with the highest values person in top and they won reward according to the rank they achieved

Research paper [5] shows that they have changed the previous methodologies of plan breeding by using the gamification model. The objectives of research are to provide ease way to improve participatory with less limited resources which lead to success. It is full of interactive fun activities. It is a card game model which has pairwise ranking of traits. They have collected data in 9 rural communities in Germany which took place in November to December 2014. They have clearly illustrated the percentages of participants with complex formulas. They used Bradley-Terry model to analyze the data which is provide by the Application

There is research [6] which shows the impact of motivation of farmers when they take decision making on technologies. The research purpose is to understand why there is a difference is technology adoptions in Sri Lanka and Czech Republic. Relationship of intention-behavior with other behavior types. This does not show Application approach for motivation. Data collect from both countries and data analysis done using regression analysis. They have calculated and participants' overall results using mathematical statistical formulas. The results show by using the tables with the percentages values which is measured by Cronbach alphas methodologies. Research paper illustrates that attitude is a main characteristic of Czech Republic farmers has where in Sri Lanka understandable Behavior controls with attitude. Social pressure can be effect to Sri Lanka farmers as well. They have showed the limitation for the study which discuss about the questionnaire They mention it should be not clearly what might have asked from them, and the sample size is better when it is large where they have considered small number of participants.

when it comes to Sri Lanka, the mindset would be same. Most Sri Lankan farmers motivated by the attitudes they got. Farming experience educational knowledge will determine the attitudes of farmers except age gender or farmland. Research [7] has been conducted in Badulla district in Uva Province and data collected through questionnaire survey by individual farmers. It illustrates that 91% of farmers have farming experience and there are 90% of farmers whose age is above 30 years. Majority of them are educated up to Ordinary Level or above levels. It shows that experience of farmer gained by the opportunity, risk taking. The purpose of having the research is to investigate upcountry farmers of their entrepreneurial attitudes. How it effects. The facts considered is the innovation, opportunities seeking and obtaining risk

Furthermore, the research Paper [8] shows that two major farmers can be found. One who motivated by sharing details and contributing to scientific research and others are motivated by community factors. These categorizations have been made by conducting questionnaire, 426 face to face interviews in different communities of farmers from countries in different continents in 2014, 2015. countries are India, Ethiopia and Honduras. The purpose of the papers is to farmers' motivation to participate in citizen scientist project and the farmers' mobile phone usage. Principal Component Analysis methodology used to group farmers according to their motivation. They have used different successful methodologies to analyze as well they represent analyzed values using graphs and figures. They have also mention that the country background and the education level characteristic will affect the farmers' motivations on Agriculture overall 20%. They have illustrated that the gamification will increase the egoistic intrinsic motivation of farmers. Which means the information sharing mindset farmers and the community interaction mindset farmers.

When it comes to entrepreneurship of agriculture, there is a Russian research paper [9] about Indian agriculture which shows the motivation policies of agricultural entrepreneurship. Research paper shows that motivation policies effectiveness will be decreased because of the lack of attention to the different entrepreneurs' types. They

have mention that there are hereditary and non-hereditary entrepreneurs were there and it says that non-hereditary communities including early retirement groups have greater decision-making skill and contributing greater to rural development of agriculture. Their aim to develop Decision theory in agriculture motivation and debasing. In different entities, the reason for differentiation of non-hereditary and hereditary is that they have different number of alternative methodologies. They have used more reference than any other reviews to show that the methodologies they implemented. They criticize the existing agriculture entrepreneurs' classifications. They have used graphs, diagrams, tables and different formulas to show the methodologies and workflow of project.

The following research paper [10] discussed about the socio-psychological aspects of small holder farmers would have faced to maintain successful agriculture. They have mention adoption of land management practices in dryland and water stressed lands according to the socio-psychological factors. They have collected 350 random small hold farmers for the questionnaire. Mainly Multivariate probit model has been used to investigate the factors as well as to identify and analyzed land management practices adoption. Finding shows that the practices have been used to increase the productivity of crops, Soil fertility and water retention capacity. They have mention that farmers used agroforestry system, compost or crop-rotation to increase the productivity. The research illustrates that the education, information, attitudes, group membership effect the adoption of socio-psychological aspects of land management practices.

They used equation and used mathematical terms to maximize the effort of the studies as well as the probability included in the research paper also used graphs and diagrams to illustrate what they have been done so far for the agriculture.

There is a research paper [10] in nutshell it describes the risk for farmers which also have been slightly discussed in above research paper. This following research paper try to illustrate the overall risk for farmers the attitudes for these factors to happen. Which is take part in Ethiopian agriculture. They have mention that they collected data from cross-sectional survey. They mention that natural hazards, input output price

volatility, technological risk, financial shocks, and human security are main resources for the risk in agriculture in Ethiopia. They have divided farmers into 3 sections according to the risk. The finding shows that the farmers who has educational knowledge, strong capital who has received training are less risk also this shows that specific farmers should be provide more attention to awareness of agriculture, build adaptive capacity to shock hazard, got them up-to-date information, and improve skill and knowledge.

Study conducted in six villages in northern Ethiopia, and they have mentioned the temperature of the land they encountered. They have done analysis using probability and statistic way and get the details using different mathematical methods and equations which are complex. Anyhow they have used less graphs but include many tables and reference to prove the quality of the research they conduct.

There is a research based on India [11] which discusses about the psychological constructs towards the agricultural technological adaptation. They have conducted the research using of planned behavior. The behaviors based on the Attitude, Subjective Norm, perceived behaviors. They have used 731 farmers from India. It has been taken place in placed call mini-kites. From the research they have found that Educated farmers are more likely to adopt the technologies less educated people are not like to adopt technologies even though it is helpful for them. They have also adopted the Swarna sub adoption model for rice crops other than planned behavior. They have mention that It is important to investigate farmers to inclined more technological adoption.

They have shown the results of regression analysis testing and the conducted workflow as well. They did not mention any other mathematical equations as well as calculations on the collected data. They have mentioned that this is new research are to discuss and there is a possibility that the results may slightly differ.

1.3 Research Gap

Our research idea and methodologies of motivation individuals and families and make them sustainable in economy are pretty much new approach for agriculture because motivation through mobile Application to individuals or families in agriculture area papers would not be found.

There are some existing gamification models in agriculture area, but it illustrates the farmers' participation to the plan breeding [5] which include the card game with fun activity. The purpose of the paper is about to create easy method to implemented by non-academic members and with limited resources. Still paper has some limitations to the system they need to reduce training need for participation. Papers is about participation attribute of farmers of plant breeding. Local adaption by non-specialist members are some of them anyhow. Their research does not conduct under the psychological aspects of farmers. And the purpose of the research to participation to the plant breeding. Our research is about to motivate throughout the whole process not only participation with including the psychological aspects through mobile phone App. They have used card game for the gamification model instead our research uses animation and motivational psychological impression to motivate user.

Research paper [4] it has the same kind of approach, but it is related to increase of engaged more user to system not to motivate them throughout the project also it is focused on the improvement of farmers' communication between them and professionals. They have also implemented gamification model including rules feedbacks where in our project we include image-based values feedbacks. When it comes to rewards, they provide virtual rewards where we provide discount for them to be motivated.

1.4 Research Problem

The proposed Application is about to make users motivated to engaged more on agriculture works even they have less amount of space anyhow there are several papers can be found which do not provide proper solution for motivation.

If individual person or family have enough space for agriculture works, they would not have inclined to make it happen because they do not have motivations to do. Less of them know the advantages and benefits they gathered. So, their valued empty space will waste for nothing while some people in Sri Lanka wish for more spaces even Sri Lanka has the cultural behavior for agriculture. for the Covid Pandemic some people faced bad situation without having money which we can be seen on Television. Some people not motivated for growing while in the pandemic even they have enough of spaces for agriculture works. That's why because of their lack of knowledge of what the benefits they gathered can be economically sustainable. Their earned money can be used for daily household items. They can manage benefits as their preference

Furthermore, some research papers [4] implemented the gamification model for agriculture though it does not go well. It does not focus the psychological aspects of how human thinks, how they feel about the Application which effect the motivation and gamification models as well. Proposed Application focus to implement gamification model in different way using images. Those research papers they did not concern about the market value analysis for the crops they grow.

It is necessary to overcome this problem. Suggested Application provide solution for above problem and implement best system for Agripreneurs

.

2.OBJECTIVES

2.1 Main Objective

Main objective of this paper is to motivate the end-users to engage to the platform and motivate other users by gaining the benefits in economically through the application Which flow is continue by the motivated behavior and including different psychology aspects by using specific interfaces for the system. Paper considers the how human thinks their attractions, attentions and their behaviors. In Application decide to include different UI for attraction, animations to motivate end-users and users keep motivated until they sustainable in economically.

2.2 Specific Objectives

1. Create of Gamification Model

   Creating a model to engaged user more with the Application and also include user input and will display the earn price for the motivation of user which undergo with calculation with crops selected.

2. Create of regional leaderboard.

   Creating a regional leaderboard where it shows the list of users of same area with the details according to their growth crops which is a result of the motivated output, also include users according to their ranking as well.

3. Create of Reward Model

   In reward model, it will give discount for the money that earned in auction platform through the Application. It helps to motivate user by seeing the discounted value.

3.METHODOLOGY

3.1 System Overview Diagram

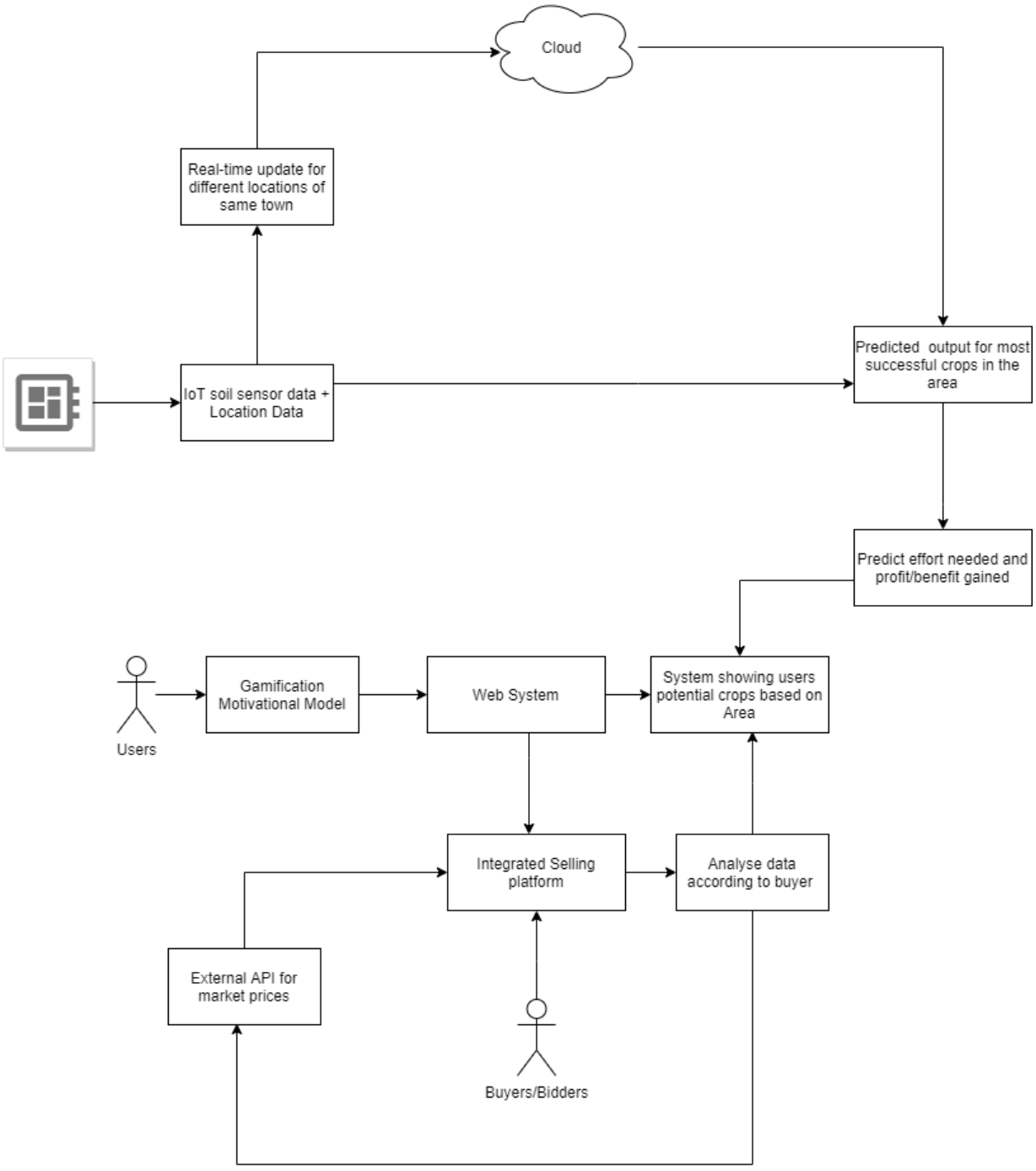

Figure 3.1.1: System overview diagram

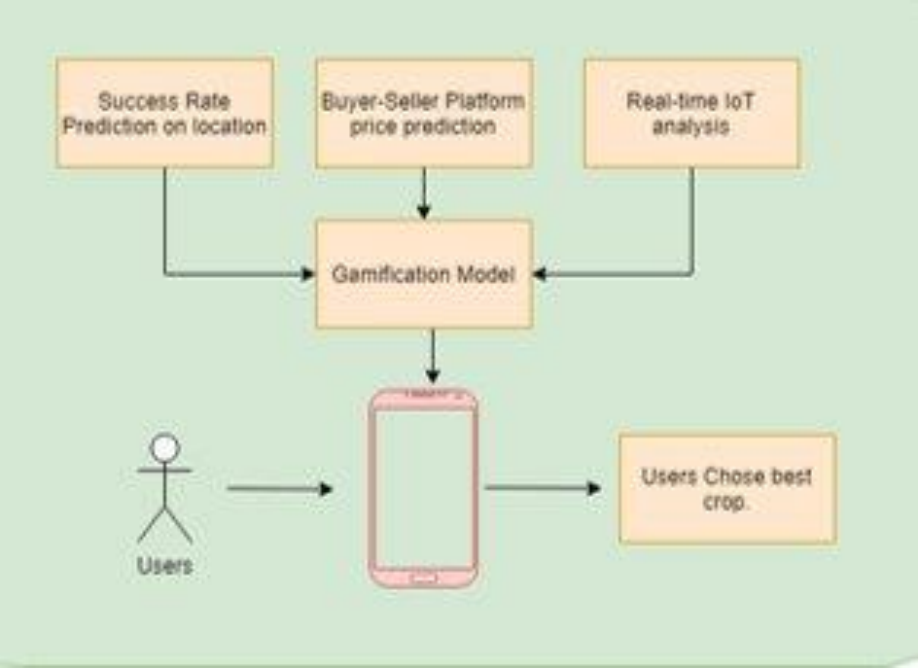

Figure 3.1.2: Gamification Model

As shown in the figure, To the Gamification model IOT Auction platform details and success prediction crops will be integrated.

3.2 Methodology

When it comes to project managing, Iteration model and Agile methodology was considered in this project because the requirements slightly might be changed according to the user. Agile scrum methodology always accepts the changes well.

In Iteration model. It undergoes with different stages while it is iterating which are requirements gathering, design, implementation and testing phase. Why selecting this model is,

- The requirements are defined but it slightly changed so agile methodology is needed. Agile methodology can accept changes and work well.

- In project development new technologies can be introduced so process should be iterative if changes fail it should iterate to previous phase and redo it

Agile Scrum methodologies used with many sprints for better implementation of project accepting the changes well. Spring longs for weeks sometimes it could long for month. Trello project management tool will be cooperated for managing the project task well. As well as in Microsoft teams we have maintained the planner for tract the task and completion of the project so far. We have gone through Microsoft teams call for discussion of the project and go with WhatsApp call as well. Some calls have gone through with the supervisor to get ideas for the Application as well.

First, Research conduction through the google form with the hope of understand the user land area where they live and common questions like salary they earn. It was possible to get the response from 30 people who are mainly based in western province and southern province. Purpose of the google form is to get an overall idea of the Sri Lanka families background and wealthiness.

Planned to create mobile Application because now a days any individual use mobile phones. Therefore, Refer the research articles to get the idea of what must been implemented and study about the psychological articles which are on google of how human interact with the devices and what should be implemented. It illustrates the how UI should be implemented. It described that limit pages to minimum number with less human interact while providing every necessary information with one single touch.

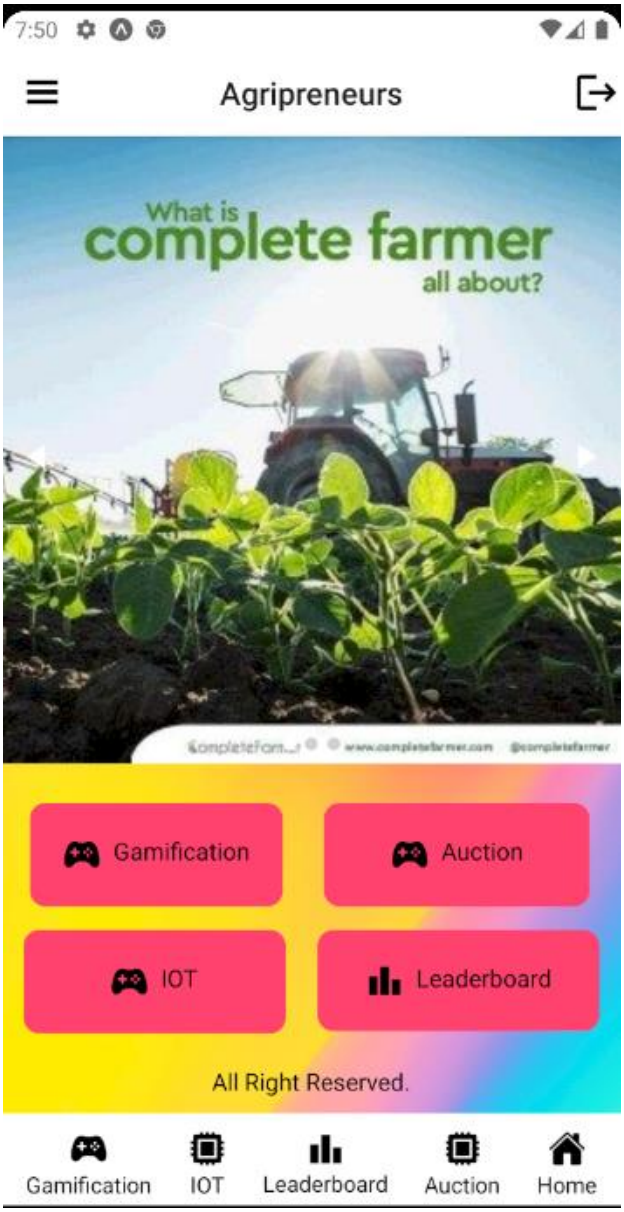

Figure 3.2.1 -HomePage Screen

As shown in the figure, In Home Page I have used Image slider to make feel real of the Application to the user. Although used the Bottom tab navigator over the Application. Used Pink color variation to the entire Application to get the human attention more to the Application because it mentions that warm color which are closer to red color variation will get human attraction.

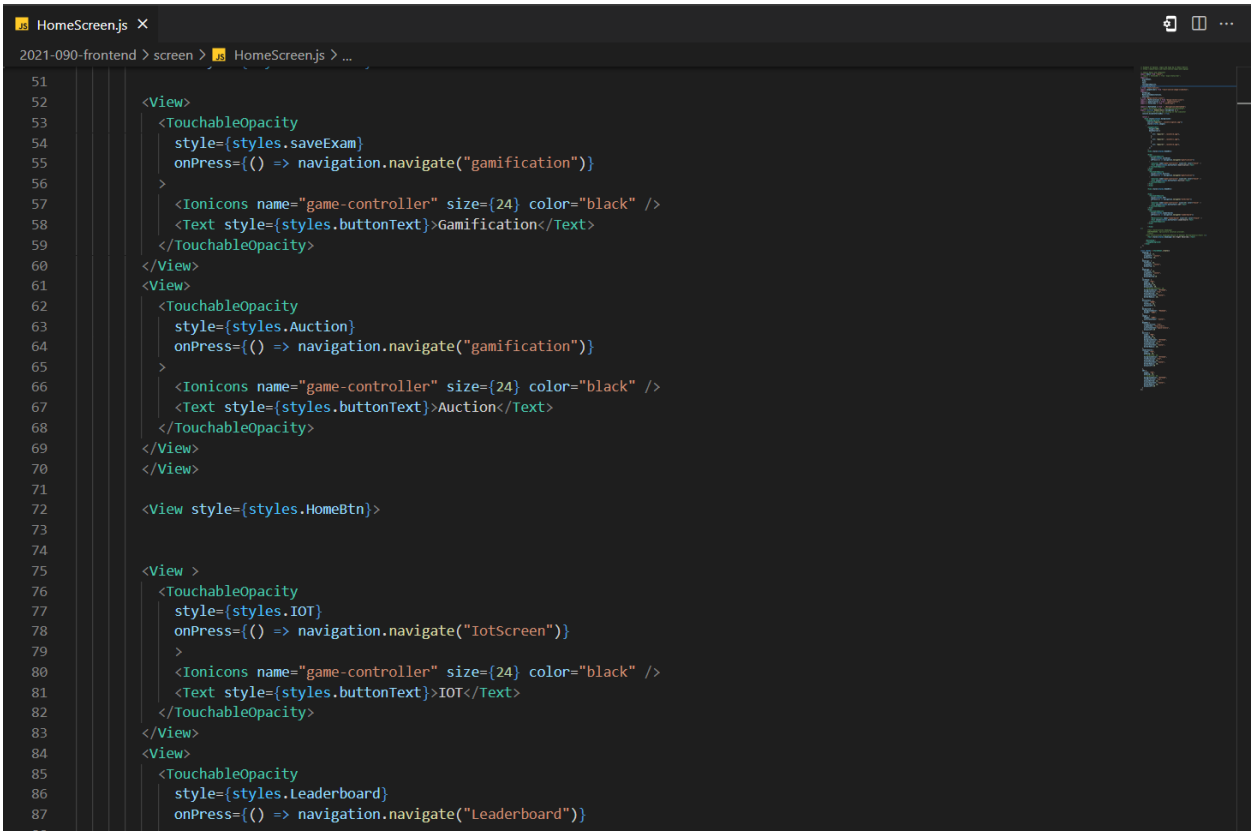

Figure 3.2.2– Frontend HomeScreen.js

```
import modules downloaded
import react, react natice elements
import screens

created the function(){
    inside function return statement(
        <View>
            Main view component to render the UI
            <imageslider>
            #View of the Buttons
            <View>
                #Inside the View component Button declares using
                #TouchableOpacity component
                <TouchableOpacity>
                    #which has the property of styles to style
                    #component and where to navigate
                    <Icon>
                        explained the icon properties
                        <Text>Text need to display in button</Text>
                    </Icon>
                </TouchableOpacity>
                #repeat of button four times
            </View>
            <BottomTab>
        </View>
    )
}
#creation of style variables with passing objec parameters
```

Figure 3.2.3 - Pseudocode of HomeScreen page

React native has same react structure but this is native. First, we must import files that have been used to the referring page. Inside a function it has return statement where it returns JSX elements. To render JSX elements it should wrap with view elements. Structure can be divided into component wise. Inside view element it has image slider and inside it has button shows where to navigate. In this scenario it is different pages according to the button clicked.

Limit the pages in mobile Application and used warm colors possibly in the Application where psychology says it is possible to get the human attention. Design the UI according to it and sketch the wireframes of the Application According to these psychological motivational aspects build the main pages. React-native with many plugins used to created the Pages.

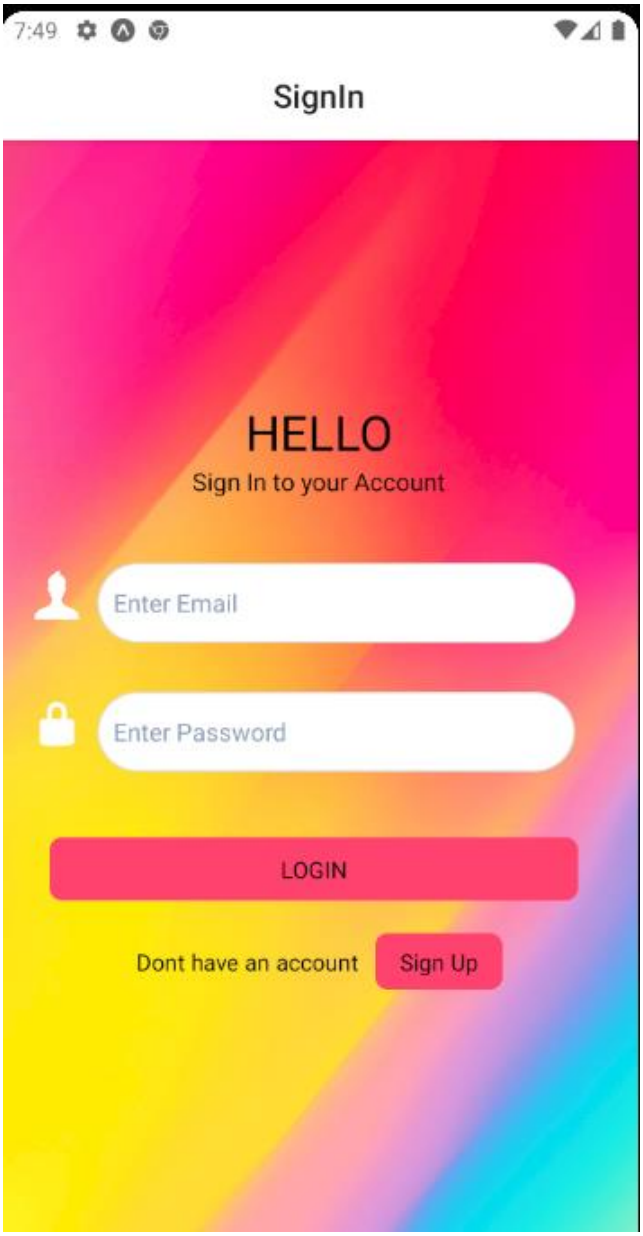

Figure 3.2.4 - SignIn screen

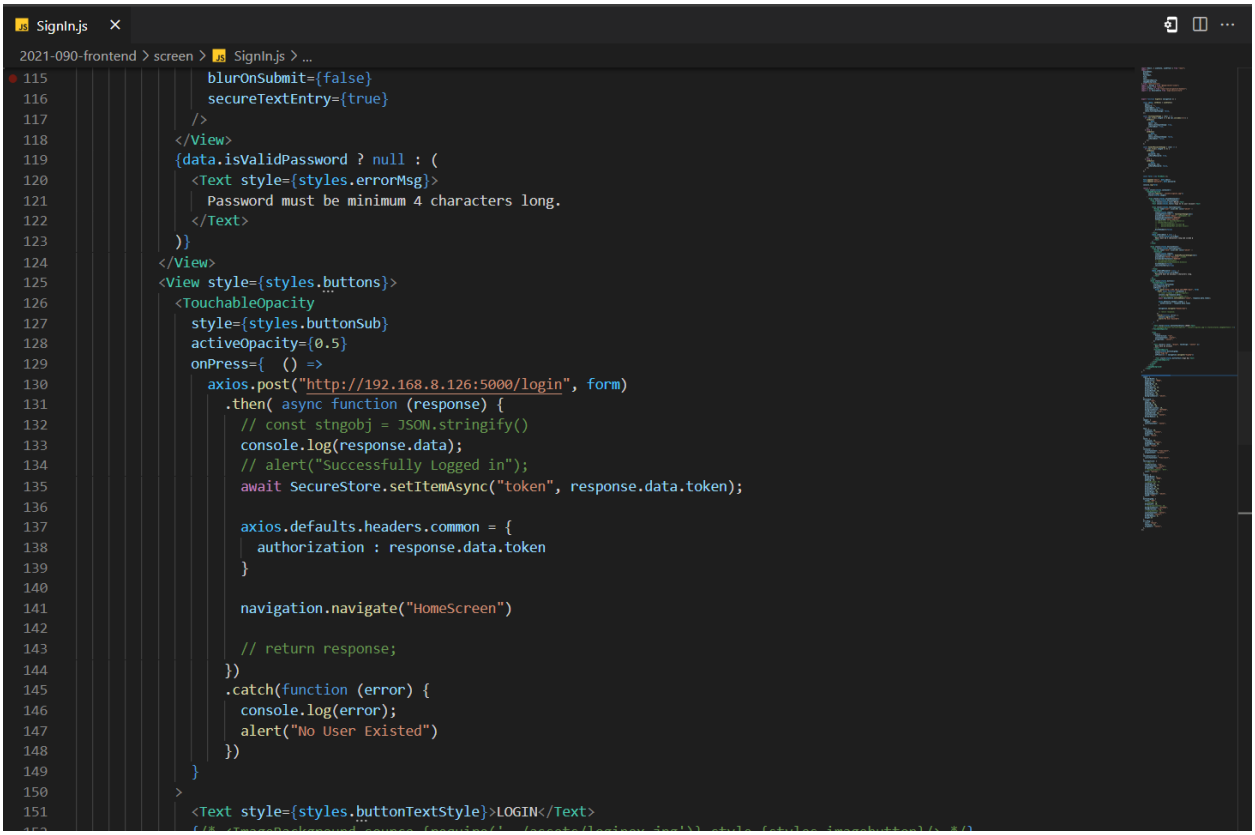

Figure 3.2.5- Frontend SignIn Page

```
import modules downloaded
import react, react natice elements
import axios, secure storage
import screens

created the function(){
    inside function return statement(
    #use state hooks for the login credentials values
    #validate of credentials
    #form data object created to send data as Form-Data
        <View>
            Main view component to render the UI
            <ImageBackground>
                <TextInput>
                    <Validation error message>
                <TextInput>
                    <Validation error message>
                <login Button>
                    #include axios module to post data to specific uri
                    #from the callback function get the token for login
                    #set token to async storage
                    #set token to authorization key in headers
                    #navigate to homescreen if no errors
                <SignUp Button>
                    #navigate to sign up page
        </View>
    )
}
#creation of style variables with passing objec parameters
```

Figure 3.2.6- Pseudocode of Signin Page

As mentioned above import necessary files. Sign In page has used react Hooks for the identify the state of the user such as email and password. Include validation of user using yup plugin module. Data send to BE in Form data type. Below that I have used main View wrapper elements and inside it has the textinput where user enter email and password. Also, under the textinput elements separate a section for display the error.

Inside login button I have used axios module for send request inside on press function of button call the endpoint from the FE to BE and I the callback function BE send the token for login in json format. Save the token in the storage for react native to identify user. Put the token into headers in react native and if validation success then logs the user to home page. In Sign in page, it has Signup button to register the user to the system.

concurrently build the BE of the project using flask python which create the basic routes and Authentications. Use Redis Database for the leaderboard and Mongo DB for rest of the Application.

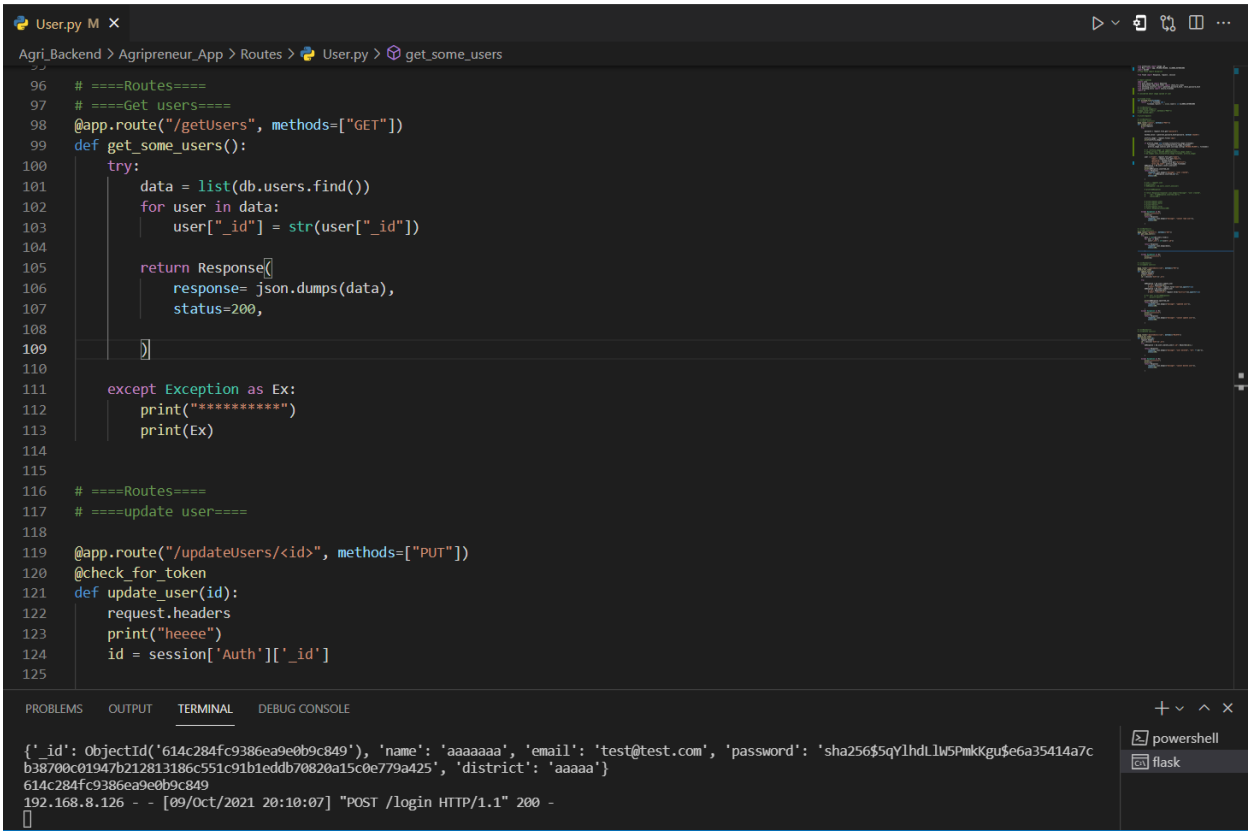

Figure 3.2.7- sample Flask user.py

```
import DB, main app
import flask
import token validation, security
import os

create route('user/') use post method to create users
create function()(
    #get the front end password hashed it
    #get the front end request with payload
    #saved into DB

    #send the response using json object with ID

    # if error occured catch the error hand handle it
)
get route('getuser/') use get method to get users
create function(){
    in try block:
        #get the list of users
        #for loop get the id and convert to string object
        #return the response in json object

    in catch block:
        #if throw and error catch and handle it
}
put route('updateuser/') use put method to update users
update function(){
    #check for token get the user details from headers
    in try block:
        #update user with certain values
        #save while update the user
        #send response to frontend using json object

    #if error occured catch amd handle it
}
delete route('deleteuser/') use delete method to delete users
delete function(){
    #check for token get the user details from headers
    in try block:
        #delete user with id and send response in json object

    #if error occured catch amd handle it
}
```

Figure 3.2.8- Pseudocode user.py

As shown in the Figure, used flask framework for the BE because we have the capability of adding more ML modules to the Application than other framework.

I have imported the modules and plugins in the beginning of the file. First, created the post method in order to create new user. From the request it send the user details in json format. In BE get the user details, password hashed using SHA256 algorithm and with the other user details that sent from FE save in the Database user collection.

Send the response to FE mentioning that successfully created the user if process success otherwise mentions the error occurred and handled the error.

For the second route, create the get route to get the user list which are lies in Database which is quite simple than other routes. Query the user in the database loop the users using for loop and convert to string. Return the response in json object to the FE and if error occurred handle it

Third route Is to update the user where I have used put method to update. Inside the update function I have check for the token which token are send from the header to the BE from the FE. If the authentication success update the certain fields with set command and save updated details inside the Database.

Send the response if successfully update the user with message in json format. If there were and error handle the error and proceed accurately by handling the error.

Last route is the deletion of the user. Used delete route for the deletion of user where user will delete from the entire system. Inside delete function check for the token first which is acquired from the request. inside the request token attached to itself.

Inside the function get the id of the user and delete the user relevant to id and send the response to FE informing that user delete in the json format. Outside block statement catch the error and handle the error as well.

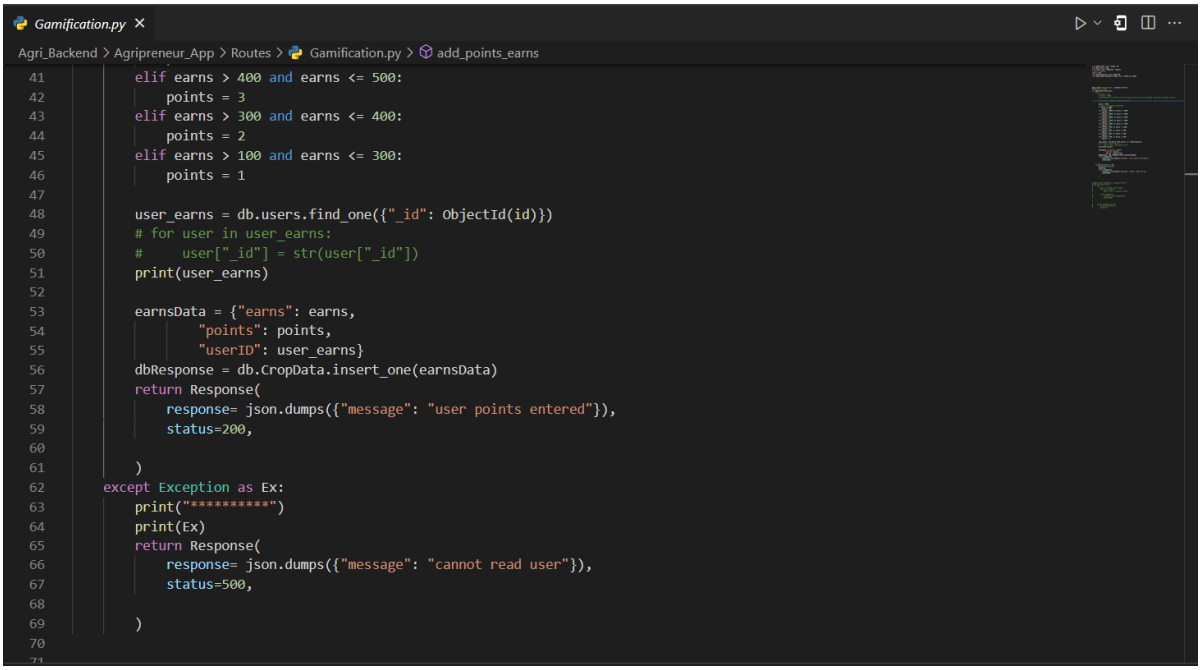

Figure 3.2.9 - Flask Gamification.py

```
import DB, main app
import flask
import token validation, security
import os

create route('points/') use post method to create users points
create function() (
    in try block:
        #according to earns, points allocated to users
        #using if codition

        #points 1 -10 will added to user

        #find users according to id

        # created object from earns points with user data
        #save in cropData collection

        #send the response using json object with ID

    # if error occured catch the error hand handle it
)
```

Figure 3.2.0.1 - Pseudocode of gamification.py

Import necessary modules for the BE. Create a post route for create the user in Database. Inside function used try block, using if condition according to the user earns allocate the point 1 – 10. Then find the user according to the token. Using the user details and create a new object with the earns value and save it in the crop Data collection. Response sends back to the FE with the help of json object.

Separately BE and FE of the Application build. In the final stages BE and FE integrate and deployed to cloud platform for better Availability and reliability of the Project.

Almost completed version of Application distributed among the user for Acceptance testing which shows great feedback from user. Afterward, Application distributed for several group of people and the rest of people develop the crop without the App which was planned to come in action after developing the completed Application in order to get the feedback of the Application

3.3 Commercialization Aspect of The Product

There are a smaller number of Application for motivate users in Agricultural field. For those who want improvement in field can buy the Application which has the potential ability of motivate user while engaging with the Application. Motivation factor is the commercialization part of the Research which is represent by the Mobile Application. Application has better UI with animations for user to be impress leaderboard as well which helps user to motivated.

We have planned to sell the Application to any buyer who show interested in the agriculture field with the hope of improve in the filed in every way. It provides discount for the user of Application when he sells the crops in auction platform to buyers. Discounted the money when transaction happens between buyer and user of Application according to the auction platform. As developers, money gathered will be used for the cloud configurations.

3.4 Testing And Development

First, created the repos on GitHub before the project started. Study about the React-native and Django python. Then change the technology stack: moved Django to flask because of the library support for the project and the easiness to build BE.

Mainly developed the basic UI of the Application according to the Wireframes. We have used expo for build the Application. Globally enabled it using npm command install modules and plugins//ss of modules

There are three main modules: They are Gamification, Leaderboard, and the Reward module. First build the Authentication pages and afterward build the home screen of the Application. Which includes the button for four different modules of the team members as well the images sliders to engage user more to the Application.

Bottom tab navigation and Drawer navigation created to navigate throughout the Application. Where bottom tab can be seen at the bottom of almost every pages except signup and leaderboard pages. The drawer navigation can be seen at the sign in pages as well. Code separation can be seen at the bottom navigation as well.

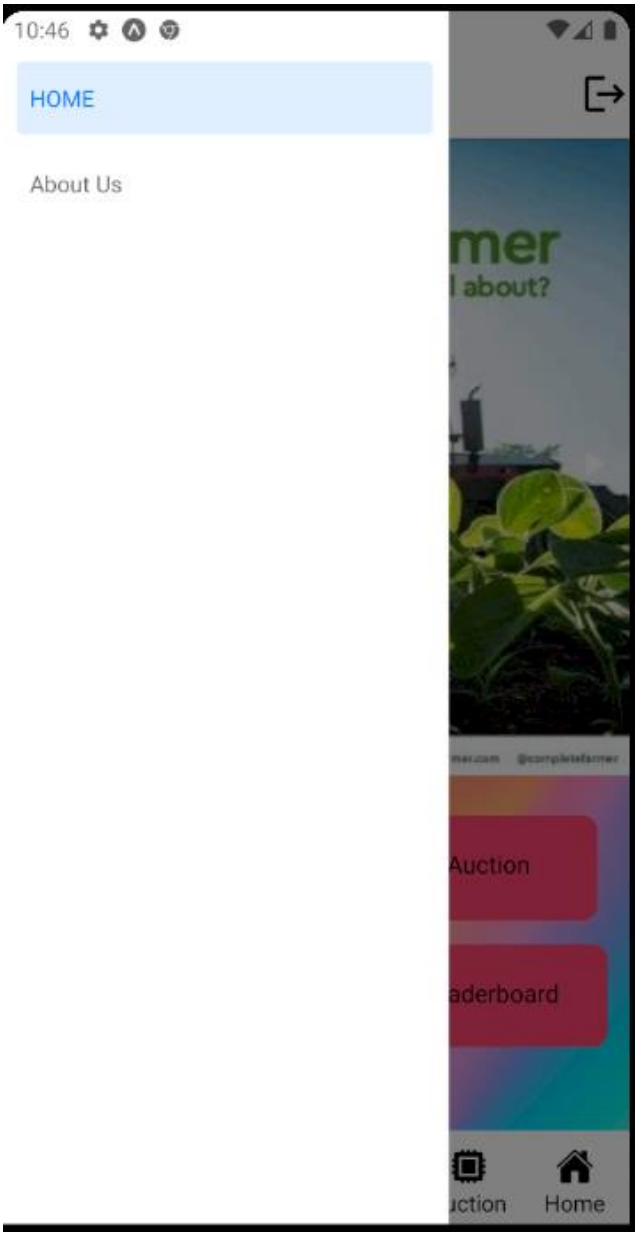

Figure 3.4.1 - Hamburger Menu

In figure, it illustrate the Hamburger menu. It has two stack navigations. In those Screen it has the screen under stack navigations.

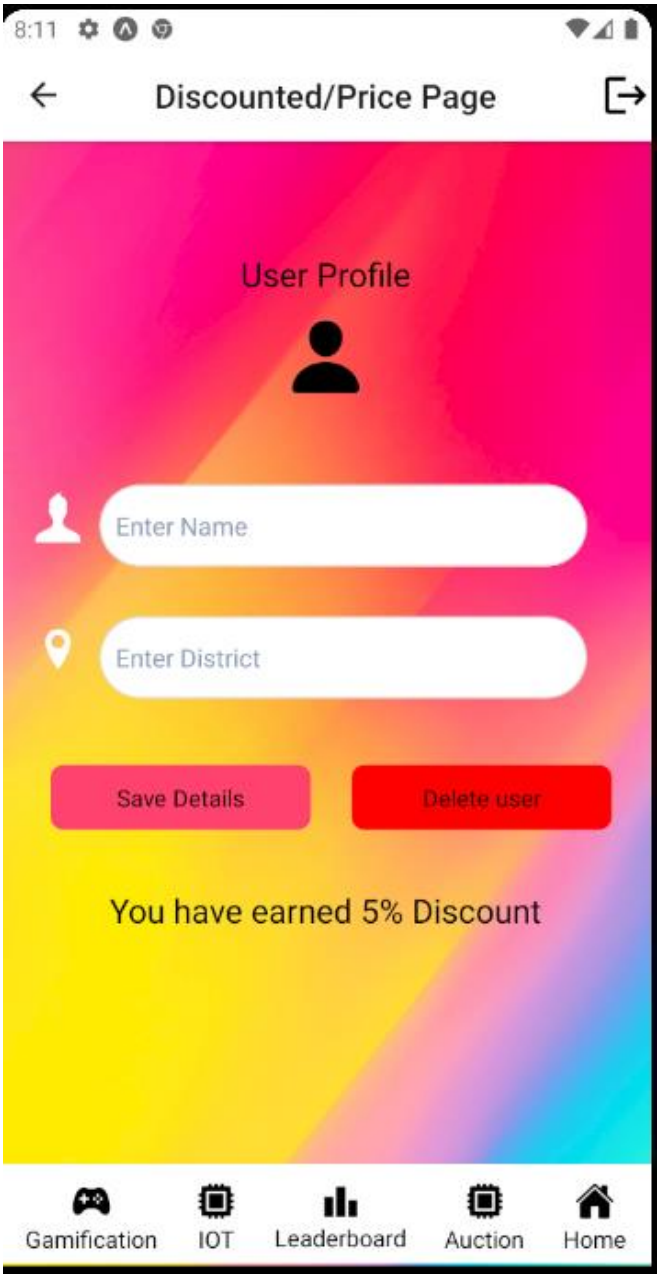

Figure 3.4.2 - Price Screen

As shown in the figure I used Bottom Tab navigator to animate and make easier of user to use the Application.

Gamification models include the input from user of the area that planned to grow crops. In this page user has to select the crop which predict from another member's function according to those inputs earned values display at the bottom.

Use equation for calculation of earned values. And which is calculated by following equations. This is the point where other member's module integrated. Best crop selection will be found on the gamification page according to the crop the earn value calculated. In this page, this is the place where point calculated in BE.

Get the information of Number of Plants can be grow in each square meter(X),

Given Area(A),

Number of plants can be grown in Area (PA) = Given Area(A) x X

$$PA = \sum_{(A)(x)} (A)(X)$$

Given that Number of plants contain in1KG(CP) ,

Number of KG amount can be grown in given area (NA) = AP/CP

$$NA = \sum_{(AP)(CP)} (\frac{AP}{CP})$$

Given the 1KG price of plants (KP),

Earned Value (EV) = KP x NA

$$EV = \sum_{(KP)(NA)} (KP)(NA)$$

In Leaderboard, I have used Scroll view component for scroll the view where it displays set of users who are ordered by the earned price in gamification model. The card used to display the user which is touchable. When user click the card, it redirects to the price screen which is the reward model pages. In BE, Redis DB used to rank the user.

Redis DB is im-memory cache memory. It is helpful for cache memory and fast access the memory with new data. It has more properties to manipulate the DB. I have used Zrange property to rank users which then send back to Flask and it will send to FE.

Figure 3.4.3 - Redis output in cmd console

In Reward model page, it displays the discount user earned which is dependent on the points they have collected. The discount happens for the money between user and the buyer in the action platform which is calculated in price page. In the same page user can update their name and district and also user can delete themself from the whole Application.

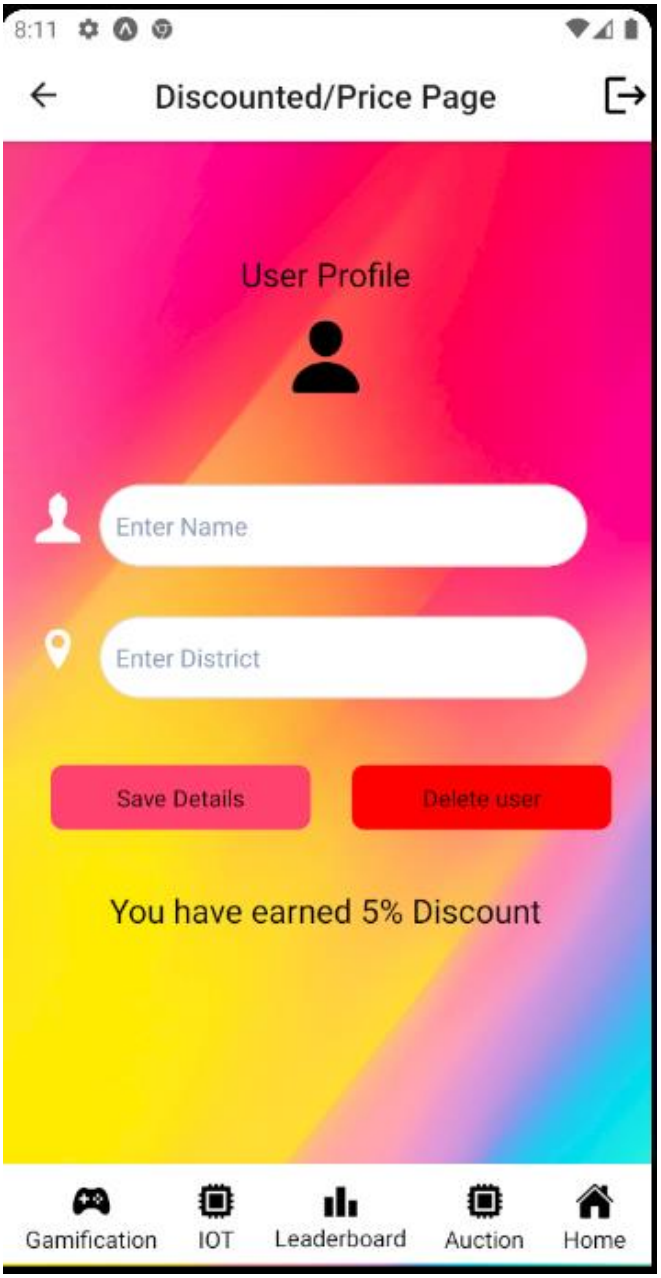

Figure 3.4.4 - Price Discount page

Coding of the Application done using VS Code tools and folder structure maintain in the Application for reuse of code. MongoDB, Redis DB used as databases of the Application. Redis DB used for the ranking of user because it supports more than Mongo. The basic primary DB of the Application is Mongo DB which is handled locally.

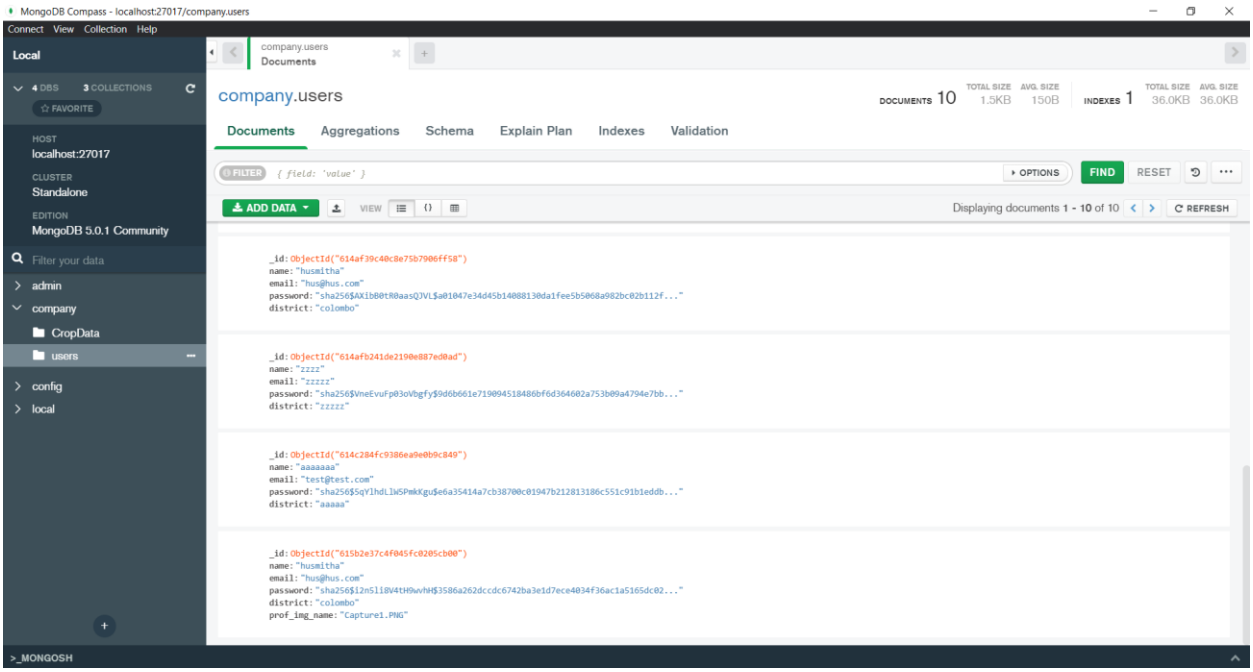

Figure 3.4.5- MongoDB

Concurrently BE of the Application build with flask documentation. The coding of the Application done using VS Code and plugins available for flask which are: JWT, pymongo are some of them. Separation of code can be seen at the BE as well. Authorization, Authentication separation and routes separation can be seen. In each route JWT token Authorization happens where each route token should be present. Password hashing can be seen.

Application integration began at the end of the development stage. We have used CORS libraries in BE for website cross origin policies. In the React-native Axios libraries used for integration to BE.

Non-Functional requirements took into consideration when developing the Application. Some of them are Availability, reliability, performance, usability will be considered in this section. With the integration of cloud platform, it maintains the availability of the Application, where user can log anywhere anytime. Reliability is an effect of availability. when considered the reliability the Application should provide

sustainable operational over time. It is possible because of cloud configuration. Application guarantee to provide best responsiveness of interacting with the system it depends on the cloud platform and the how the application handle the request from servers. Usability is the main nonfunctional requirement should consider in the Application. Application needs to meet the user's expected outcome of the system as well it provides user satisfying functions and UI to interact with the application also it motivate users to engage with the Application. Maintainability reflects from developers' side code and logic should be maintainable for better future. Code separation and configuration convention user for the maintainability of the Application.

Testing the Application is much important as development. It helps to identify the defects of the Application which could help to reduced cost because later the defect found higher the cost. Testing includes integration testing, unit testing, system testing and user acceptance testing. When it comes to Testing, it is began at the beginning of the implementation where when every feature added it has been tested by the developer with the help of Postman and running the mobile App locally on the machine.

Integration testing is most important because in gamification model 4 major components integrated and show it as once. It is the point where integration testing is come in handy. At the final stage integration testing done and send the prototype version to 30 users for User Acceptance testing. Most users accepted few shows bugs in the UI fixes the mention bugs and resend it. Where user accepts the Application.

All testing performed above it need for system to be available and work fine which are successful passed.

4. RESULT AND DISCUSSION

4.1 Results

Application distributed across members and 30 responses have been made. Response from western district and southern district. It mentions that there were few bugs on the UI and some response mention that add some features if possible. Anyhow it has some good response as well shown in below.

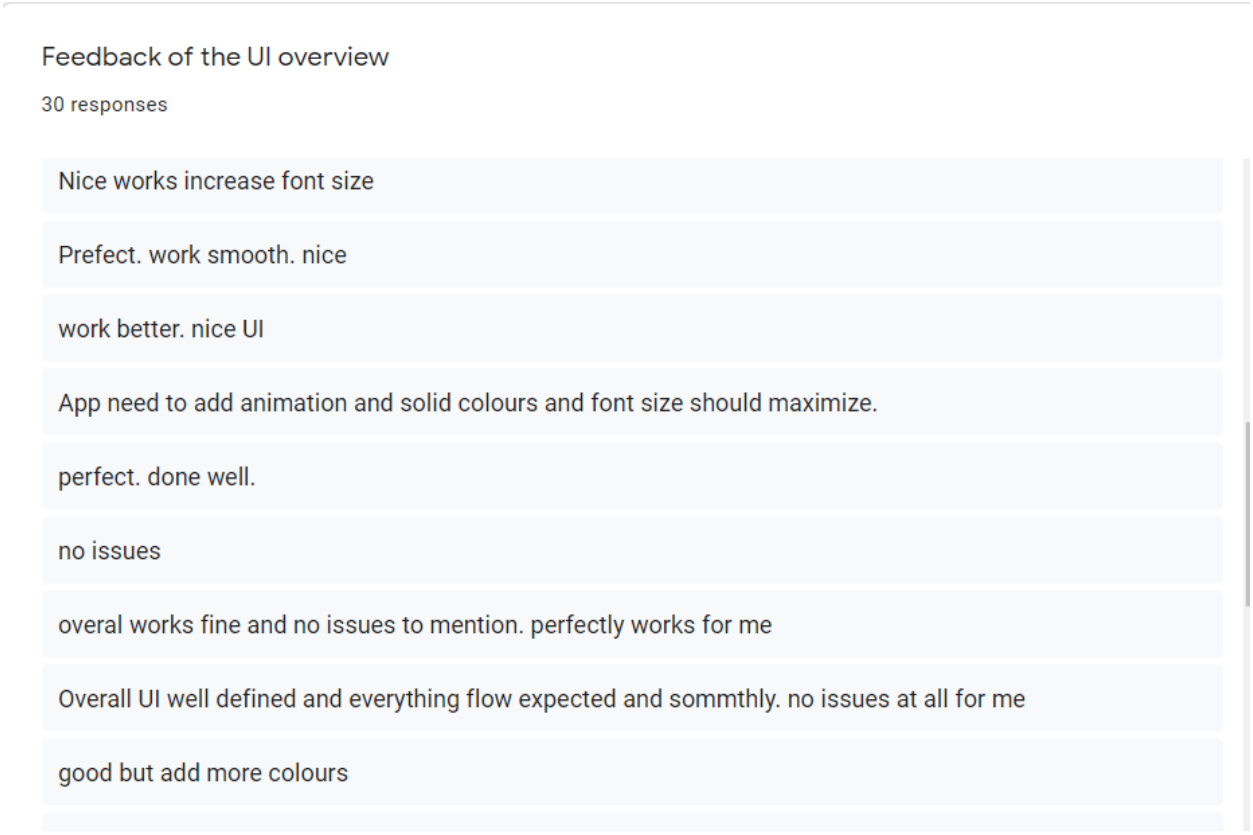

Figure 4.1.0: Feedback of UI overview

AS the above figure mention that the Overall UI they accepted. Few responses describe that there should be UI improvement. Most of users mention that it work as expected and run smoothly.

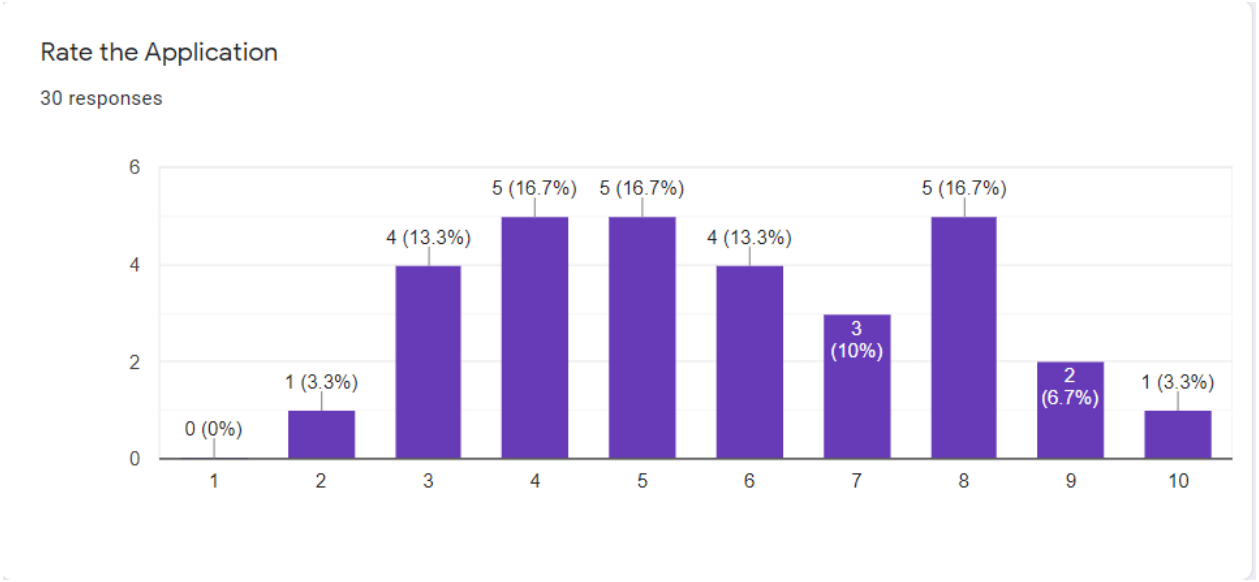

Figure 4.1.1: Rate Of Application

As shown in the figure, Users rated the Application with good results. It shows that 5 people rate with 8 score which can be considered they have enjoyed the Application and also same number of members mention that it has mid score for the Application which can be accepted. Although the user who rate the Application has the average IT knowledge as well.

4.2 Research Finding

Throughout the research the human psychological thinking, motivation factors have been found. It shows that warm colors have more human attraction that cooler colors which are: Blue, Purple. Psychologically it shows that there should be motivation to be motivated which should come from the confidentiality.

Research shows that they have enough of space to grow crops, but they were lazy to do so even if they good in financial situation.

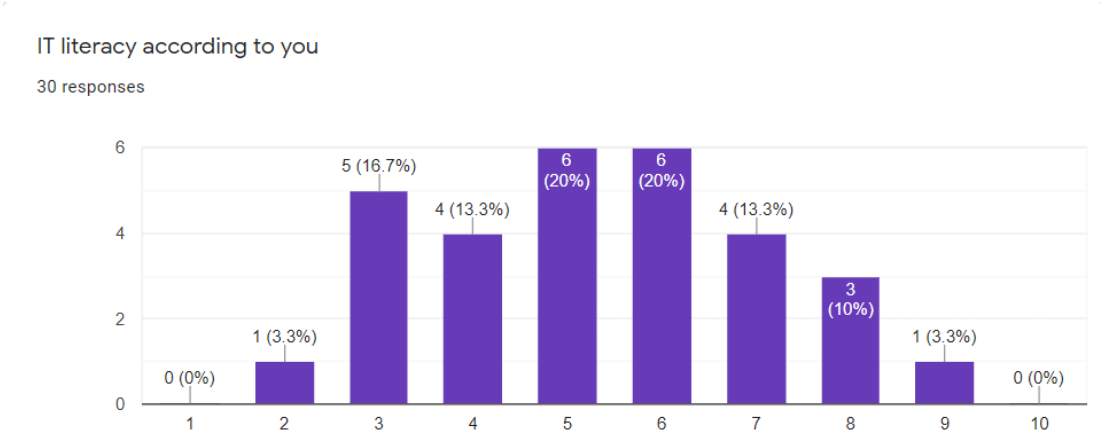

Figure 4.2.0- IT literacy of users

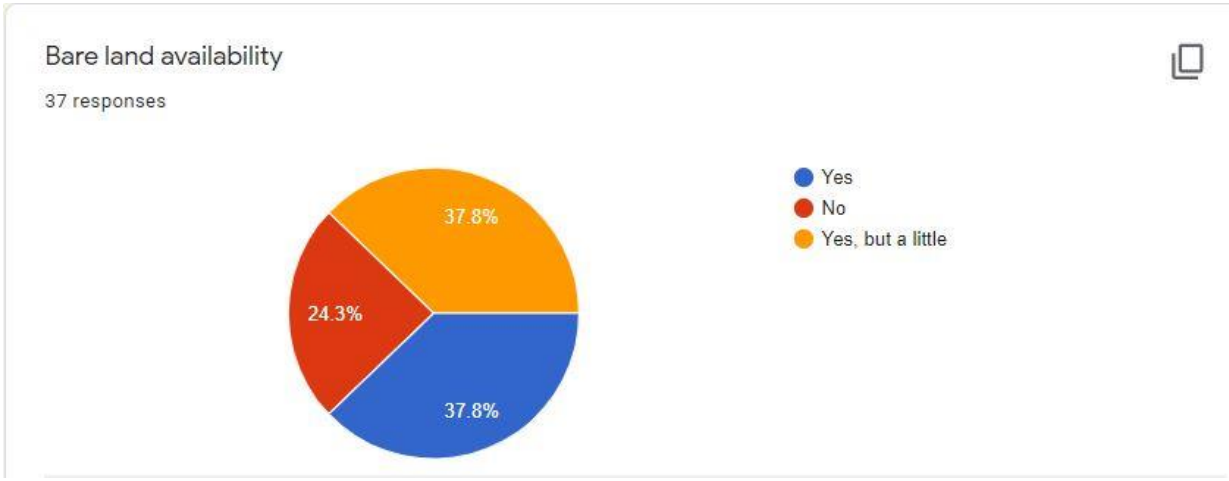

Figure 4.2.1- Bare Land Availability

This illustrate that most people have a at least small bare land available for crops. Percentage wise it is 75.6% out of 100%.

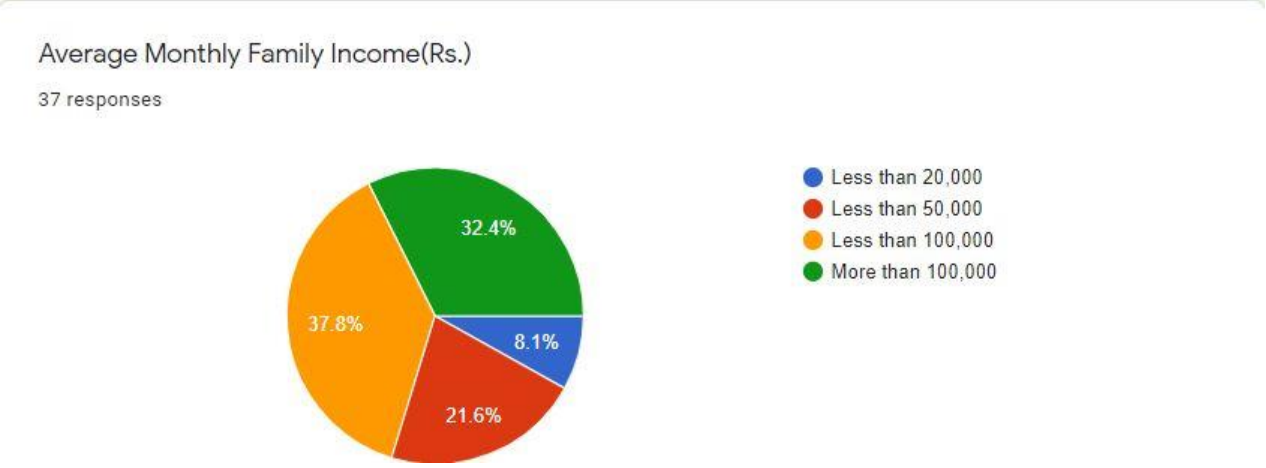

Figure 4.2.2 – Average Monthly income

This figure shows that the Most of families take into consideration has less than 100,000 of income which is somewhat enough money for family improvement.

4.3 Discussion

As shown in figures, it seems that most families have enough somewhat space to grow also shown that the few people cannot have the bare land for crops which could be possible like in western province. All results based on 37 responses from google forms conducted by us.

In google forms I have include the average salary of the people who participate the research as shown in the figure most families have less than 100,000 average salary per month. Also 32.4% of people has more than 100,000 salary which means they are somewhat stable in economy as well. Though families like that can earn extra money from the Application.

With the hope of user motivation, we have moved on with the Application and at final stages we have released test prototype Application for user to test which process also called User Acceptance testing. For the results we have also created a google form and asked to rate the application and give some feedback of the Application. 30 participants participate for the testing of Application.

Users' feedbacks have more different way of expressing the Application but most of users accepted the UI informing that it works perfect with the Mobile. But some users show some bugs in FE UI which are mostly minor errors. Most users mention that font size should increase and some users mention that add colors to the Application as well more animation should be added. One user said more features should added to the system. Results are expected as this way. Most users accept it few people shows some bug though minor bugs.

we have also asked the IT literacy of the users which shows average results. Which can be accepted from the non-technical users. We have asked to rate the Application as of their knowledge. Which shows good results as shown in figure 4.1.1.

5 people (16.7%) rate it has 8 out of 10 which means application can be accepted. I have expected outcome as these results. And also, same amount of people mention that it is 5 out of 10 which means average limit also some people mention less than that not expected that much of results it cloud be the people that mention few bugs of the Application which are minor. Excepted that people overall UI feedback are appreciated and accepted by the most users.

I have considered the bugs people mention and fix the bugs they have mention. Add different colors but adhere to the warm colors' variations. Change font sizes add more meaning full messages to send. Did not add many features to the Application keep it to minimal standards basic functionalities will considered. Include alert message for user to get understand better. Most importantly keep the Application simple and convenient for use.

Expected Output In nutshell,

Expected Model	Expected outcome
Gamification Model	User interacts with the model. It provides earn value for user according to crops.
Leaderboard Model	It provides leaderboard where user can see the rankings.
Reward schema Model	It provides Discounts on taxes according to the rank user obtain.

Figure 4.3.1: Expected output

4.SUMMARY

In nutshell, this is the major component of the Research and all other modules that are completed by other members integrated to this module. Main outcome of the research is the Mobile application where user can interact and improve themselves as a individual as well as family.

This module encompasses the 3 modules. They are Gamification, leaderboard and Reward models. All modules have each different feature. Combination of the module has the capability of psychologically motivate the user which engage the user more to the Application will results eventually the success by improving the grown crop in the specific area.

Gamification model has the earned value of users as a major component and it also include input area and to selection of crops. According to the selection of the crops and the area provided earned value will depend.

Leaderboard shows the ranking of users which eventually motivate the users. Ranking of users depends on the earn values of the users. User shown as a card inside the card it shows details and also it navigates to the reward model as well.

Reward model has the discount range for users according to the earned point also it will motivate to engage with application. Other than the discount section, User can edit their name and district as well in reward model page also user can be deleted by user after no longer account will reserve in Database.

5. CONCLUSION

This research project is about the motivated the users to grow crops and make them sustainable in economically. Project is managed by the psychological motivational aspects. Project include gamification model to engaged user more into the system with

activities to interact and also including discounted price for using the Application as well as a leaderboard to get the user ranking according to the points.

In the project lifetime of one year, From the beginning of the project we have started to implement the system as far as possible. However, managed to come up with design and in first month then implement the solution as quickly as possible. Final stage is planned to integrate the other member component for the mobile Application where auction platform and IOT based details will be integrated.

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