TapShip – Tap to Ship

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***Abstract*—The Agriculture is the backbone of economy and one of the most important sectors of our country. We studied prevailing agricultural marketing system in India and identified the problems and inefficiencies. The propose system transform the government APMC's market into an electronic marketplace (exchange) called e-mandi for agriculture produce. An important function of the electronic exchange is to match the supply of the farmer's produce with the demand from the wholesalers and retailers. Every year, news headlines are filled with suicides of farmers because they are been conned in the market by middlemen, and they also face a lot of difficulty in transferring their goods like crop, fertilizers, seeds etc. from one location to others. So, to save the precious lives of our farmers, we need an effective platform, from where they can get right price of their produce and easy way to transport their shipment. Solution to this extreme problem, we introduce our Project called 'TapShip'. The main actors of this system are farmers, customers, drivers, kiosk centers and admin. Crops added by the farmer is open for sale where customer can bid to get the crop at its best price. The role of middlemen has been eliminated to benefit both the farmers and customers directly. Driver also gets the ample opportunity of employment, directly connecting with our portal. Every aspect of farmers, customers and drivers is considered to ensure them the best price without affecting anyone.**

Keywords—farmers, e-market, transportation, agriculture, APMC, e-mandi

I. Introduction

India is a land of agriculture. The backbone of Indian economy is agriculture which contributes nearly 17% to the total GDP and generate employment for 60% of the population. The condition of farmers across India is alarming, nearly 80% of the Indian farmers are either marginal or small farmers category. Every year, there are thousands of reports of Indian farmer suicides from different parts of the country. We have come up with the solution to overcome various issues and inefficiencies in present agriculture marketing system in India. The farmers must be provided with adequate choices to sell their produce without any barriers at attractive prices across India. Presently APMC (Agriculture Produce Marketing Committee) in each state across India is looking after sale or purchase of agriculture produce. The APMC was introduced with the motive of safeguarding farmer's right and prevent their exploitation by intermediaries. With the passage of time this system becomes inefficient because of traders monopoly and excessive commission and charges levied on farmers.

These all factors motivated us to create a web application which help the farmers to become independent while selling their crops in agriculture market. We tried best to incorporate trending technologies to get customers direct deals from farmers at an attractive price and a reliable transport service along with user friendly platform. And also developed a solution for drivers to get them deals in seamless period of time along with easy payment service.

II. Related Work

There have been few progresses in the field of Agriculture Market like developing the transporting and tracking management systems with the help of some advanced algorithms and programming scripts, but till date, there is no efficient effort has been made in this area to solve the problems especially, farmers are the one who is struggling the most. Hence, there is a strong requirement for a one-stop solution for the problems existing in Agriculture Market [1].

There are many problems that farmers face during the transportation of their crops. Like, not getting the proper price or getting conned in the agriculture market, no proper communication between the transport delivery person and the farmer, etc. [2]. One more big challenge for farmers is that to get a good profit for the efforts and investment that they had put in. We know that it is not feasible to reach all customers physically for farmers as the whole process consumes too much time and effort wherein our farmers have a limited amount of time.

There are some variations of India's Agriculture Market that concern farmers' choice of market channels and producer prices [3]. Some of those variations are mentioned as below:

- Indian agriculture is dominated by smallholders, primarily engaged in subsistence manufacturing.
- The Farmer-trader relations are often based on mutual trust, and generally involve tied transactions involving credit, input, and output markets.
- India's agricultural price policy provides for the procurement of some products at which the central government set minimum support prices (MSP); which is deliberately done to create incentives for farmers [3].

We will further discuss the possible solutions in this paper which can be brought into existence to eliminate the problems

and the variations which currently exist in the Indian Agriculture market.

III. Objectives

Objective of this project is to develop an electronic marketplace for agriculture produce, where farmers have freedom to sell their crop anywhere in India. The following objectives were addressed in this project:

- To develop a platform where farmers can get the right price of their crop and earn better profitability. This will enhance the rural development and agriculture practice.
- To develop an infrastructure where customer and driver directly communicate over transportation requirements.
- To develop opportunity to all truck drivers by offering work for all available shipments.
- To make easy payment and more secure transport service.

IV. Case Studies

To get a better understanding of the problem faced by the user, we directly went to some farmers and a few of transport agencies.

We asked few basic questions and found some grass root level problem faced by them.

A. Inputs from farmer

Here are few points as the conclusion which our team received by talking directly to farmers.

- The problem arises during crop harvesting. All of the sudden prices of that crop drop steeply due to excess availability in that region.
- Even if the farmer get the transportation facility, they don't know where to sell those crops and where to transport to get better profitability.
- The digital platform is difficult for them to access. Majority of the farmers are illiterate and these digital platforms are very complex and not user friendly.

B. Inputs From Transport Agency

Here are few points as the conclusion which our team received by talking directly to truck drivers.

- The reason behind high transportation charge at far distance is unavailability of return shipment.
- Transport agency do not have contact at each and every place throughout the country for return shipment.
- They don't know when return shipment will come in advance, so they charge up and down cost together.

The problem with app or web interface which takes care of availability of shipment problem.

- There are so many truck drivers who are illiterate.
- Those who are literate also they are not that tech friendly so it will be difficult to adopt that technology among truck drivers.

Different types of things which is shipped and some of the different factors took into consideration.

- If fruits are transported, then temperature, humidity, time of transport is few factors which needs to be taken care of strictly otherwise the fruits will get destroyed.
- If furniture is transported then it will require some spacing between them and to tie properly.
- If animals are transported then arrangement of their food and water should be made.
- If rainy season is there then proper covering of trucks need to be done.
- These are few factors which are responsible for cost of transportation.

C. Our observation

Few years ago farmers were throwing the onion on roads because they were not even getting cost of production, on the other hand we at different place buying onion at INR 40 per kg. If there is a proper transportation and distribution across India, then both the farmer and consumer would have benefitted.

This is not only about the onion but there are many things in which both side farmer and consumer will be benefited.

V. Methodology

In this project, we are using different technologies in order to make our platform secure with a good user experience. The technologies and hardware requirement are described in different sections.

A. Technologies

Here we are using several technologies which are listed as follows

1) CyberSecurity: We have worked on many factors to protect our platform from cyber attack.

a) SQL injection protection: SQL injection is one of the most famous attack where malicioius code is inserted or injected in the database and the attacker can run any SQL command like insert/update/delete. To prevent this attack we converted each and every input to string so, that no one can inject SQL code and hack our platform [4].

b) URL Encoding: We have changed the URL of the crops and all other things which possibly could be accessed by anyone by directly hampering to the URL. Fig. 1 shows no user will know the exact path and no one can perform any type of code injection attack in the address bar [5].

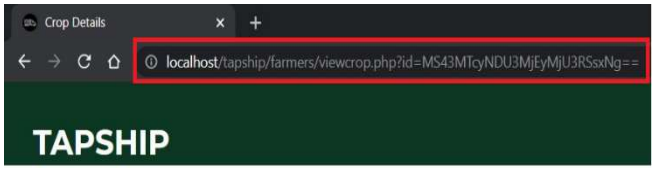

Fig. 1. URL Encoded

c) Two Step Verification: we have implemented two step verification via OTP(one time password) which is very necessary in order to re-verify the person who is attempting login. The basic flow of working is shown in Fig. 2

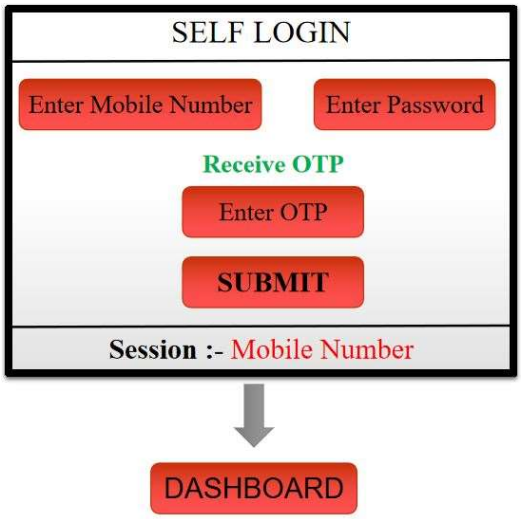

Fig. 2. OTP System

2) Machine Learning: We have used ML by running various python scripts on server side and displayed the output to client in the form of web/app interface.

a) Recommendation of crops to the customer: We are recommending the crops based on the location of the customer which is based on the pincode which we took at the time of registration. After that we are sending it to the database and then lastly we are processing it by a python script and applying ML algorithm and then customer will get the better recomendetion.

b) Recommendation of shipment to the Truck driver: Depending on the location of the truck driver our system will automatically recommend the shipment which is nearby to the driver. This will be done by fetching the live location of driver and sending all that data to our database. Our ML system will process the data and gives us the optimum result.

B. Hardware requirement

It has 2 type of hardware requirement.

1) Server side: Any working shared linux server will be sufficient with python with some libraries installed, the name of these libraries are pymysql, sqlalchemy, pandas, requests, matplotlib, numpy, tz, datetime.

2) Client side: Any working device with web browser and internet connection with speed of 512kbps.

VI. System Design And Implementation

The application is designed in a way to help the farmers to become independent while selling their crops in agriculture market. It is ensured that the customer gets direct deals from farmers with reliable transport service. This system ensures that truck driver gets right deals in seamless period of time along with easy payment service.

A. System Administrator

System Administrator plays a vital role in administration, management and support activities as shown in Fig. 3. The system admin can manage users such as Farmer, Customer, and Driver. Admin has the responsibility of verifying the details of farmers, customers and drivers. If details of any user found suspicious, missing or invalid, then admin has the rights to ask for reverification of input details. Admin can add users under Panchayat KIOSK center. The purpose of integrating Panchayat KIOSK center to serve the needy framer. All the farmers won't have access to network and mobile resources, although our system is user friendly, illiteracy and lack of awareness becomes the major hurdle.

Fig. 3. Admin Dashboard

The deployed employee in panchayat KIOSK center will login on behalf of farmer, using farmers unique-id and password. Farmer will receive OTP on to his/her mobile number to ensure that, it is the farmer who is doing all these transactions. The two-factor authentication has been incorporated to avoid frauds. The admin under crop and activities, manages the MSP of each crop sold on to this platform. The MSP is calculated as cost of production + 50% of total cost of production, that results in 1.5 times of total cost of production. Admins can see queries raised by farmers, customers and drivers and help them by providing advice and solutions from experts.

B. Farmer

Farmer is the main actor of this system. This system is designed in such a way that distress farmer can get the real price of the crop and get the maximum benefit out of it. At first, a farmer has to register themselves on our portal by providing required credentials. Upon successful registration, they can access dashboard and other feature through farmer login page. The user has to pass two-factor authentication while logging in, to ensure the user's account security. Once the user logs in to his/her account successfully, they might see the message showing account verification is pending. Initially all new users will be unverified, system administrator takes few hours to verify the details given by new user. Once the verification is granted, the new user is set to access all the feature of dashboard as shown in Fig. 4

A farmer can use the add crop feature to put their crops for sale. While adding crop they have to input few details like, category of crop, name of the crop, quantity, MEP (Minimum Expected Price) of crop, and 3 clear images of the same crop. Once the crop has been added successfully, it will come under active crop section and is ready for bidding. Multiple customer can place bid for the same crop, it is the farmer who decides, which bid to be accepted or not. Once the farmer has confirmed the active bid, then that crop is set as inactive or sold and will not be available for further bidding. Since the crop is already sold, all existing bid of other customers will be rejected.

Farmers can also access the MEP tracking facility, under which variations in MEP over a period of time for different crop can be seen. This feature is helpful for the farmer while adding the crop for sale, as they can track the prices of various

crops to get the maximum benefit. Help Zone facility where farmer's queries and problems are listened and sorted out by our experts. Say if farmer is not able to use or access our portal, they can ask for help and experts will provide the details of the nearest panchayat KIOSK center.

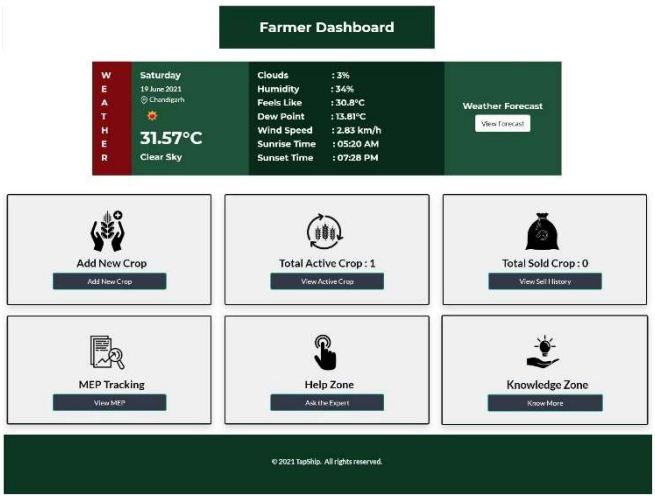

Fig. 4. Farmer Dashboard

Farmer is the biggest fighter, who can survive in any situation. However, he can't fight weather, he can take preventive measures and precaution to minimize crop losses. One way of ensuring good yield of crop is accurate weather forecasts. We are providing one week forecast with real-time weather condition like air and dew temperature, precipitation, and humidity to protect crops and secure a high and healthy yields.

C. Customer

In agriculture market there are long chain of undesirable malpractices indulge by middlemen. The farmers produce passes through intermediaries before it finally reaches to consumer. In the whole process the price of the produce increases at each stage, this finally create a burden on the consumer.

It's not only the price, but also the use of false weights, adulteration, and black marketing has motivated us to connect farmers and customer directly. At first customer has to register on our portal and after successful registration, they can access the features of dashboard shown in Fig. 5

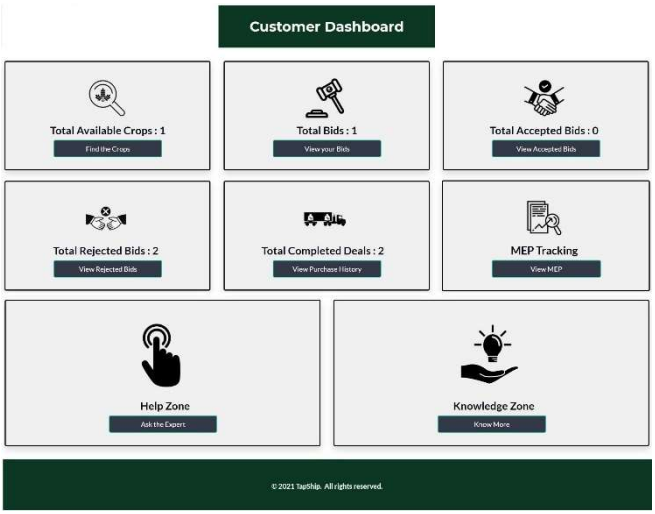

Fig. 5. Customer Dashboard

Customer has the feature to see available crops filtered based on their location. They can see all the details of crops such as price, location, details about the farmer who is selling etc. If the customer like the deal they can place the bid amount which must be greater than or equal to the price set by the farmer. If the farmer accepts that deal, next customer will be asked to do the necessary payments. Once the payment confirmation is received from the farmer, customer has option to choose TapShip delivery or Self-transportation. TapShip delivery mechanism will be explained in the next section. If the customer selects self-transport service, then he/she has to provide complete information about driver and vehicle to the farmer prior to shipment. This process is important to ensure the end-to-end safe delivery of products. Once the shipment reached to customer, they will confirm and close this deal. Customer has been provided with MEP tracking facility, so that they can keep eye on price variation of crops. They also have access to help zone as well as knowledge zone to make their experience better every day.

D. Driver

Over the year, India's transport system and transport strategy has helped in the growth of economy. But the advancement in the schemes and infrastructure development isn't good enough, it lacks implementation at the grass root level. TapShip platform gives ample opportunity to truck drivers with good pricing. They have to register themselves with required credentials on our portal. Upon successful registration and verification checkup, they can access driver portal to get the shipment deals as shown in Fig. 6

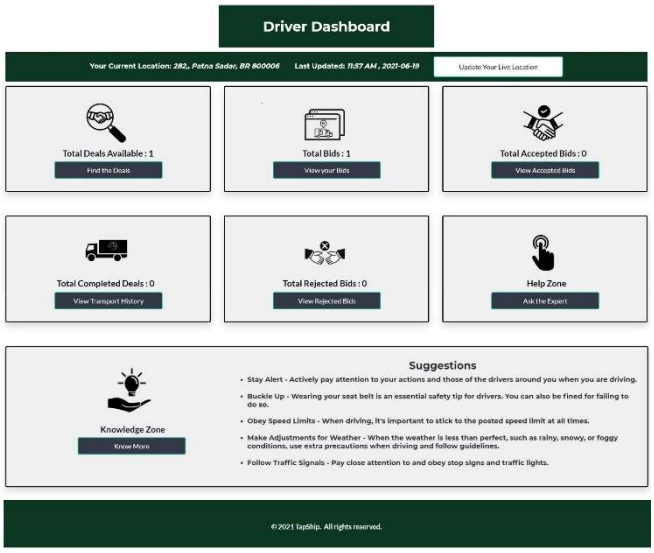

Fig. 6. Driver Dashboard

The TapShip delivery chosen by customer will be open for bidding to all the nearby drivers. Driver can get the details of shipment in find deal section. Shipment is suggested to driver based on their live location and address pincode. Using Bing API we fetch the live location i.e., latitude and longitude of driver, required attribute from this location is fetched and passed to the python script to find the nearest deals. The different shipment on to the driver portal is sorted based on the distance between the shipment source and destination.

If the driver is interested in any of the deals, he /she will place the bid amount for shipment. If the customer who

requested TapShip delivery accepts that bid amount, then that shipment is set as inactive or sold and will not be available for further bidding. Since the deal is already closed between customer and driver, all existing bid of other driver will be rejected. The driver will get the complete details of crop, farmer and customer. The driver picks up the shipment from farmer location and deliver it to customer delivery address. The live location of driver can be seen by customer as well as farmer to keep track of shipment delivery status. Driver will update the confirmation on to the portal of the final delivery. The driver will get the cash payment on delivery as per the bidding amount. Drivers has the access to help zone, where they can get the solution for their query. Knowledge zone provides better understanding of the platform and provides tips and suggestion for safe driving.

VII. Results

Farmers play a vital role in the development of a country. They are the reason behind agriculture being the backbone of the Indian economy. Hence, if there is any snag appeared which disbalances the lives of farmers, it's our responsibility to solve such issues. For a long period of time, farmers are facing the issue of selling and transporting their crops at a good price but they get usually conned in the agriculture market. Hence, we came up with an idea to form a platform – "Tapship" which is developed with a motive to connect farmers, customers, and drivers in one place.

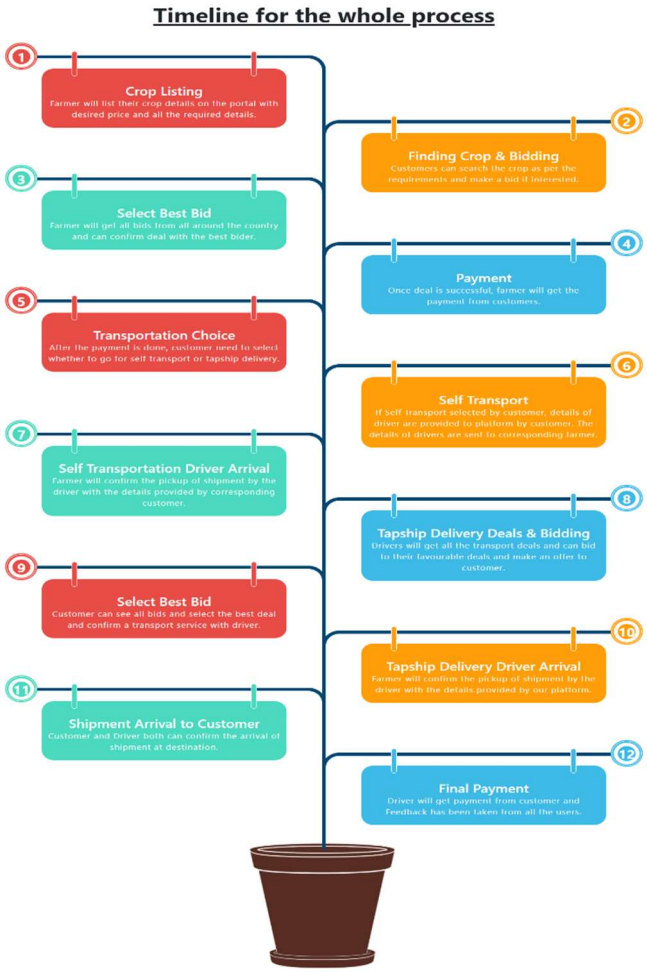

Fig. 7. Project Timeline

Fig. 7 shows the timeline for our whole process. The timeline represents the steps of events that occur in the order shown in the Fig. 7, starting from the crop listing via the farmers and gradually moving to customers, where they select their favorable crops and bidding for the same. While the farmers select the best bid and confirm the deal. Customers, further make the payment and choose the type of transportation. At last, confirmation from all three users that the shipment transportation and final payment are completed.

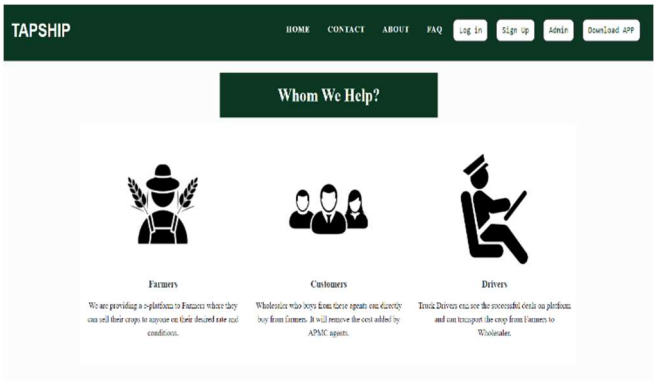

Fig. 8. Home Page

Fig. 8 shows the first page of our application. Here, the user who visits our website can go for signup and register themselves, if the user has visited our website for the first time. If the user already has an account, he/she can log in and start using our platform. Farmers, Customers, and Drivers being the main actors of our platform have a different set of operations available on their individual dashboard. FAQ section include frequent questions at one place for visitors to get the necessary solutions.

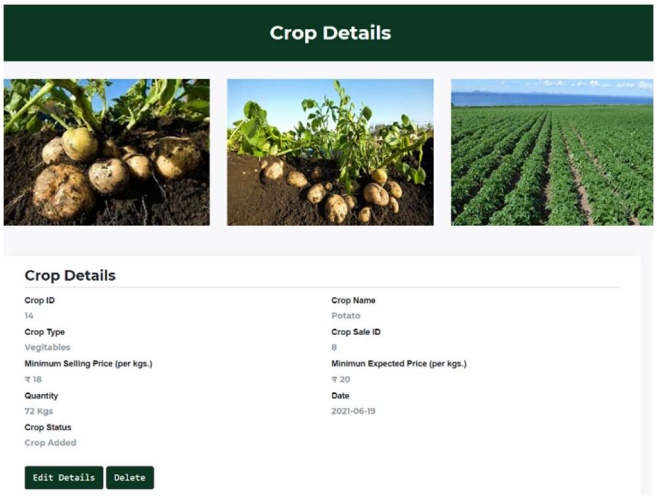

Fig. 9. Crop Details

The above Fig. 9 from farmer login shows all the details of the crops like crop id, name, quantity, selling status, etc. Farmer has the options to edit/update the details and delete the crop until no customer has placed the bidding. If any customer places a bid on that crop, the edit/delete option disappears.

Fig. 10 shows MEP tracking facility provided to both farmer and customer, to track the variations in prices over a period of time for different crop. This feature is helpful for the farmer while adding the crop for sale, as they can keep eye on prices of various crops to get the maximum benefit.

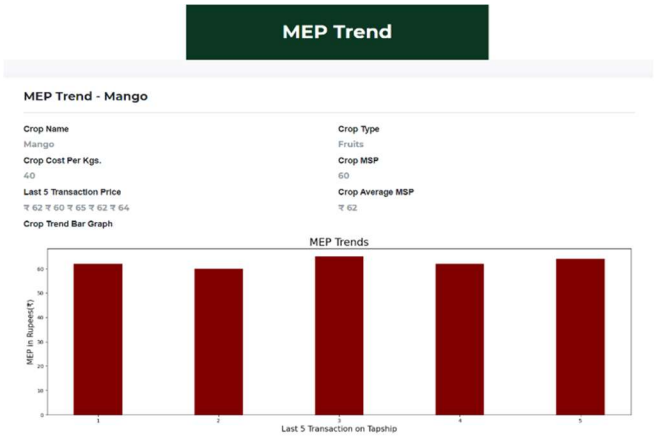

Fig. 10. MEP Analytics

Fig. 11 shows recommendation of shipment to driver is based on their live location and address pincode. Using Bing API, live location is fetched i.e., latitude and longitude of driver. Required attributes from this location is send to run python script in the backend to get the optimum result. The shipment is listed based on the shortest distance between source and destination.

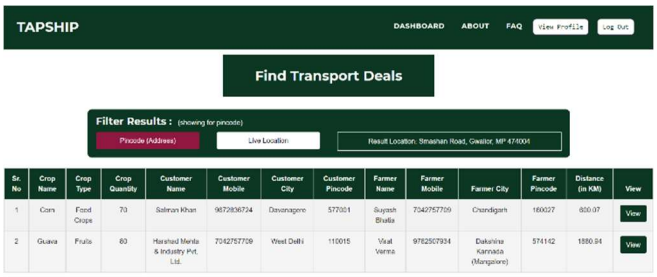

Fig. 11. Shipment filtered by location

CONCLUSION

We have successfully developed a web application integrated with security features like two-factor authentication, URL encoding and SQL Injection Protection. Our web application – "Tapship" has been proven to be an effective and efficient platform that solve all objectives and problem statements that we considered at the initial phase. Tapship is a platform that gives an opportunity to farmers to set the minimum price of crop as well as it also gives equal opportunities to customers including APMCs, government agencies, etc., to decide the best shipment price and connect all the available truck drivers with customers. It also provides Weather Forecast to farmers which will help farmers to take some critical decisions. On the other hand, our platform gives equal opportunity to customers to bid their own price to their favorable crop and complete the shipment with complete tracking of the shipment. Our platform also provides deals to the drivers associated with us according to their origin location as well as to their current location. It also provides a helping hand to all the farmers who are not literate enough to understand our platform. Our platform provides a facility of KIOSK Center to such farmers. In the future, some additional features can be added to improve the platform. We are looking forward to adding a crop prediction model which will help farmers to decide the crop depending upon the weather conditions and other factors. We are also looking forward to adding a chatbot to our application that can take up queries of any user and give them assured reply which might solve their queries.

REFERENCES

[1] Baala Kalyanasundaram, Kirk R. Pruhs, "The Online Transportation Problem," 2000 Society for Industrial and Applied Mathematics, Vol. 13, No. 3 : pp. 370-383, doi: 10.1137/S0895480198342310

[2] Gray R. Agriculture, transportation, and the COVID-19 crisis. Canadian Journal of Agricultural Economics/Revue canadienne d' agroeconomie. 2020; 68(2): 239‐243, doi: 10.1111/cjag.12235.

[3] Negi, Digvijay S. & Birthal, Pratap S. & Roy, Devesh & Khan, Md. Tajuddin, 2018. "Farmers' choice of market channels and producer prices in India: Role of transportation and communication networks," Food Policy, Elsevier, vol. 81(C), pages 106-121.

[4] D. Alam, M. A. Kabir, T. Bhuiyan and T. Farah, "A Case Study of SQL Injection Vulnerabilities Assessment of .bd Domain Web Applications," 2015 Fourth International Conference on Cyber Security, Cyber Warfare, and Digital Forensic (CyberSec), 2015, pp. 73-77, doi: 10.1109/CyberSec.2015.23.

[5] I. Tasevski and K. Jakimoski, "Overview of SQL Injection Defense Mechanisms," 2020 28th Telecommunications Forum (TELFOR), 2020, pp. 1-4, doi: 10.1109/TELFOR51502.2020.9306676.