Social Economic Challenges Faced in the Agricultural Industry and How to Eradicate Them

Ishita D Joshi [a], Ashi Gala [b], Karan Patil [c], Kalpesh Rane [d], Pinki Vishwakarma [e], Rekha More [f]

Computer Engineering Department, Shah & Anchor Kutchhi Engineering College.

Abstract: *The agricultural industry is the backbone of economy in most of the developing nations. It makes up for the livelihood of maximum amount of the rural population globally. Apart from food and raw materials, agriculture provides employment to a very large percentage of population. Since last few decades, the contribution of agriculture to the overall world GDP has been declining. There are multiple reasons leading to it, but the importance of agriculture cannot be neglected. The paper targets the two major socio-economic issues in the agro industry, which are: (i) Substandard economic conditions of the farmers. (ii) Inadequate market reach and low incentives from national and international markets. The paper proposes an Android-based application with three significant modules - The Farmer's module: to help the farmer's sell the harvest at the "right" price and better market reach, The Buyer's module: provide fresh goods to the urban market at affordable rates and The Crowd funding module: to connect the farmers to the investors for monetary investments. The paper further discusses various schemes and systems governmental, private and non-profit and carries out a comparative analysis on the gap between the proposed and the other systems.*

Keywords: *Agricultural industry, socio-economic issues, Crowd funding.*

1. INTRODUCTION

Agriculture plays a significant role in both the human and economy of a nation; that is to say, it is the backbone of a nation's economy. In rural areas, agriculture is the dominant source of income. As of 2018, it accounted for 4% of the GDP in some developing nations and up to 25% in others [1]. At present, agriculture above and beyond farming includes forestry, dairy, fruit cultivation, poultry, beekeeping, mushroom, arbitrary, etc. Thus, agriculture can be referred to as the production, processing, promotion and distribution of agricultural products. In addition to providing food and raw material, it also provides employment opportunities to a very large percentage of the population (Sustainability of European agricultural holdings). The agricultural activity contributes approximately 4.006% (% of total GDP) to the world GDP, representing 28.498% of the total employment in the world, of which 25.409% represents females.(% of total female, modeled ILO estimate) [1]. At a social level, agricultural land covers 48,632,687.604 (sq. km) of the total land, which is approximately 37.431% of the total land area. Furthermore, observing the graphs over two decades, we see that the figures mentioned above are far lesser than what it was two decades ago. The overall agricultural contribution was 4.857% in 2000 and 28.498% of the total employment belonged to the agricultural sector. The graphs below, exhibit the fluctuations in the agricultural sector over the past two decades. By 2050, the world population is estimated to reach upto 9.1 billion, approximately 34% higher than the current population. Urbanization and increased income will further accelerate the demand for food and non-food agricultural products [3]. Will agricultural growth affect rural poverty and thus food insecurity? Ahluwalia, proved that improvement in the agricultural sector does reduce rural poverty, whereas Saith proved that the market fluctuations will aggravate poverty in the coming time [15]. Hence, persistent poverty, lack of income, inconsistent access to resources like land and water, market price and production fluctuations leads to food insecurity, hunger and undernourishment.
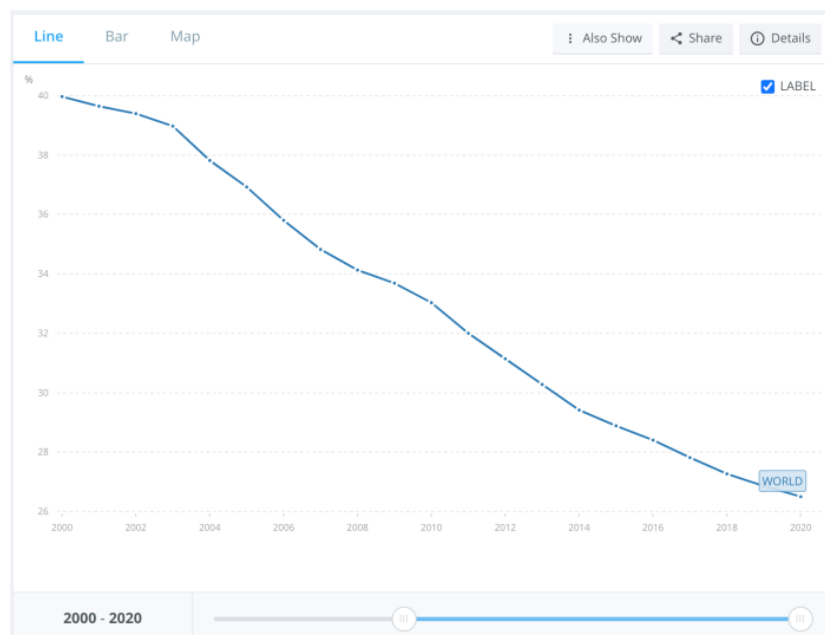
Figure 1.1 Contribution of agriculture to world's GDP

Figure 1.2 Employment rate in agriculture

Recently, technical advancements have been adopted to increase the productivity in the agricultural industry, although more investment including research and development is needed in order to meet the future food security and nourishment goals in a more sustainable way [2]. Over a period of years, many private, nonprofit and governmental organizations have come up with various systems and applications to improvise the agricultural industry in order to impact the lives of those connected to it and to improvise the socio-economic conditions of the nation. The schemes were formulated in a way to help the farmers keep up with all the latest advances in agriculture. Some schemes are designed to provide in kind and economic support to the farmers. The governmental and private systems developed line up to resolve some of the socio-economic issues in the agricultural industry[3]. The question is, if there are already so many systems and schemes formulated for the cause, why is there persistent poverty and food insecurity in the population employed in the agricultural industry?

In this paper we address the socio-economic issues in the agricultural industry and propose a system aiming at resolving those socio-economic issues in the agricultural industry. The paper discusses various different private and governmental schemes and systems by evaluating those against a set of socio-economic factors crucial for agriculture. The proposed system is designed keeping in mind those socio-economic factors in order to bring a positive change in the society. Section 2 gives a deeper insight on the socio-economic factors affecting the agricultural industry. A detailed methodology along with some visual representations can be found in section 3. Discussions on different systems against various parameters can be found in section 4.

2. Literature Review

Sustainable development has become a highly used conceptual framework for analyzing agricultural developments[6]. Analyses the European agricultural sustainability from social, economic, environmental and institutional Levels to promote food security, sustainable agriculture and rural development. The paper uses min-max methodology and multivariate techniques namely, cluster and Factorial Analysis for a detailed analysis on the 28 Member States of the European Union. The results show that the European agriculture has intermediate sustainability. [17]

MAIS (Mission oriented innovative agricultural systems) are the need of the hour. Food security and rural development with food safety has been a rising concern for past decades [7]. Emphasizes the need for MAIS to transform the current food systems. The paper elaborates the emerging concept of MAIS and encourages natural and social scientists to further develop it as a concept and approach to understand and support the transformation of food systems and agricultural innovation.

According to a survey it has been recognized that West Bengal in India ranchers chose to develop staple nourishment crops, trailed by going with nourishment crops and in conclusion unadulterated gainful harvests[8]. On an average, farmers produce three different crops per year such as staple, for example paddy; for example potato and different green vegetables and unadulterated gainful yields for example bloom, betel-leaf, potato, groundnut, sesame, and guava. These yields are predominant, productive and have market requests in a few locales of the State. Hence farmers want to develop these rewarding yields[9].On the other hand, they develop paddy just for utilization. Therefore paddy development is diminishing everywhere throughout the State.

Agriculture in Africa is developing day by day. Traditionally, the African farmer uses the same plot for several years, until its fertility declines. Between rows of corn, the African farmer plants other staple crops: legumes, such as peas, or root vegetables, such as yams[8]. This practice of growing several crops in the same plot is called intercropping. Agricultural methods used in the Corn Belt of the U.S. are very different. The Corn Belt is the area of the northern Midwest where most of the nation's corn crop is grown. U.S. industrial farmers may plant a thousand acres of just corn. The practice of specializing in a single crop is known as monoculture[10]. To harvest the crop, farmers use a mechanical harvester that picks the ears of corn and shells them into a bin. As per past understanding of change in horticulture to enable the asset poor smallholder and negligible ranchers to be ready to haggle with partners to improve their requirements for political, social, monetary and innovative turn of events[11]. It would be basic that they take an interest in all dynamics. The advances they need won't in this way be restricted to those identified with horticulture alone yet additionally to strategically, socially and financially total and altogether choose.

Sustainable development has become a highly used conceptual framework for analyzing agricultural developments[4]. Analyses the European agricultural sustainability from social, economic, environmental and institutional Levels to promote food security, sustainable agriculture and rural development[23].The paper uses min-max methodology and multivariate techniques namely, cluster and Factorial Analysis for a detailed analysis on the 28 Member States of the European Union. The results show that the European agriculture has intermediate sustainability. The Food and Agriculture Organization of the United Nations, gives an insight on the agricultural industry globally. It discusses the issues related to food security and undernourishment in rural areas. FAO proposes some of the ways to overcome challenges in agriculture and thus reach the food security and nourishment goals[2]. Another article from FAO from 2003 discusses the socio-economic issues in agriculture and ways to overcome those. The article gives an in-depth analysis in agriculture and shares its perspective on the agricultural industry in 2030 which looks quite appropriate to the current market scenario.

Technology has made great advances in agriculture. Smart farming, digital agriculture and agriculture 4.0 are some innovative ways to improvise and speed up agriculture. Laurens et al. shares a deeper insight on the different forms of digitization in agriculture (big data, internet of things, augmented reality, robotics, sensors, 3D printing, system integration, ubiquitous connectivity, artificial intelligence, digital twins, and block chain among others). The authors provide emerging ways to govern digital agriculture. They provide a future research agenda for future interdisciplinary and trans disciplinary science on precision farming, digital agriculture, smart farming and agriculture 4.0 [12].

Young farmers are giving up farming due to substandard economic conditions and are migrating to urban areas in search for employment and a better life. If this goes on, we won't get to see another generation of farmers. Various private and governmental schemes and systems have been developed to target such issues. Cropital is a crowdfunding platform for connecting the investors to the farmers for monetary investments. It connects investors from all over the world to the farmers for short or long term investments. Croptial provides the investors with some good monetary returns [25]. Fundly is another similar system except, it also allows the people to make donations.[5] The system also allows other groups or organizations to raise money for a cause via its platform. Fundly is a more diverse platform targeting not only farmers, but other causes too [24]. Farmify too is a crowdfunding platform for connecting the farmers to the investors. This Bangalore based 2019 startup aims at improving the economic conditions of the farmers by providing them with investments [30].

I support Farming is a platform to help people from urban areas transform into farmers. It aims at getting more and more people included in the farming industry. Not everyone with the dream to start farming has access to all the resources. I support farming and taking care of those resources while allowing you to transform into a farmer. Apart from that, the platform also allows one to partner with a farmer or to own a land [21]. In turn it helps the farmers by providing them with fundings and manpower. Farm manager is a system to help small scale farmers manage the farms in an effective way. It aims at bringing more and more people into farming by encouraging them by providing in kind support. It also keeps the small scale farmers updated with information on latest government schemes and offers [28].

MahaFarm is a governmental initiative by Maharashtra cooperative development corporation limited(MCDC) for Maharashtra - a state in India - farmers. It provides the farmers with in kind support and takes care of various agro-prouducts developed by various cooperatives. Thus for the strengthening of all these cooperative societies under Atal Mahapanan Vikas Abhiyan, MCDC has launched its own FMCG brand called "Maha Farms" [18]. KrishiVilla[1] an android based application for Indian farmers, helps the farmers keep up with the latest governmental and private schemes. It has been designed to take care of the updates of the different agricultural commodities, weather forecast updates, agricultural news updates. [20]

3. Proposed Methodology

To overcome the drawback of middlemen, the system consists of a module designed for the customers to receive quality goods at a reasonable price by eliminating the treachery committed by the middlemen. To deliver promising quality products, the system will take necessary measures to make sure that no duplicity is taken place and the customers are not cheated. The farmers on the other hand will be provided with deserving returns on their harvest with the help of the system providing them with quality checks and direct returns from the sales of their harvested crops.

The number of farmers going through quality deprived farming keeps increasing because of the low return they receive on their harvest. One of the major reasons behind this is the middlemen who astray the farmers and restrict the deserving returns from the farmers as well as committing fraud to the urban buyers with unreasonably high prices. The farmers need to receive their deserving profits on their impeccable hard work every quarter. Over the years we have heard many scams pulled out by the middlemen where they create a greater demand for basic commodities in the urban market keeping the poor farmers in dark. They tend to buy the harvest from the farmers at a price way cheaper than the selling price in the urban market whereas the same harvest is sold at a higher price in the urban market. An incident as such occurred in Madhya Pradesh led by the middlemen where they carried out a similar scam, here with respect to onions. To avoid such incidents in the agricultural industry, the system consists of different modules as shown below in figure 3.1.
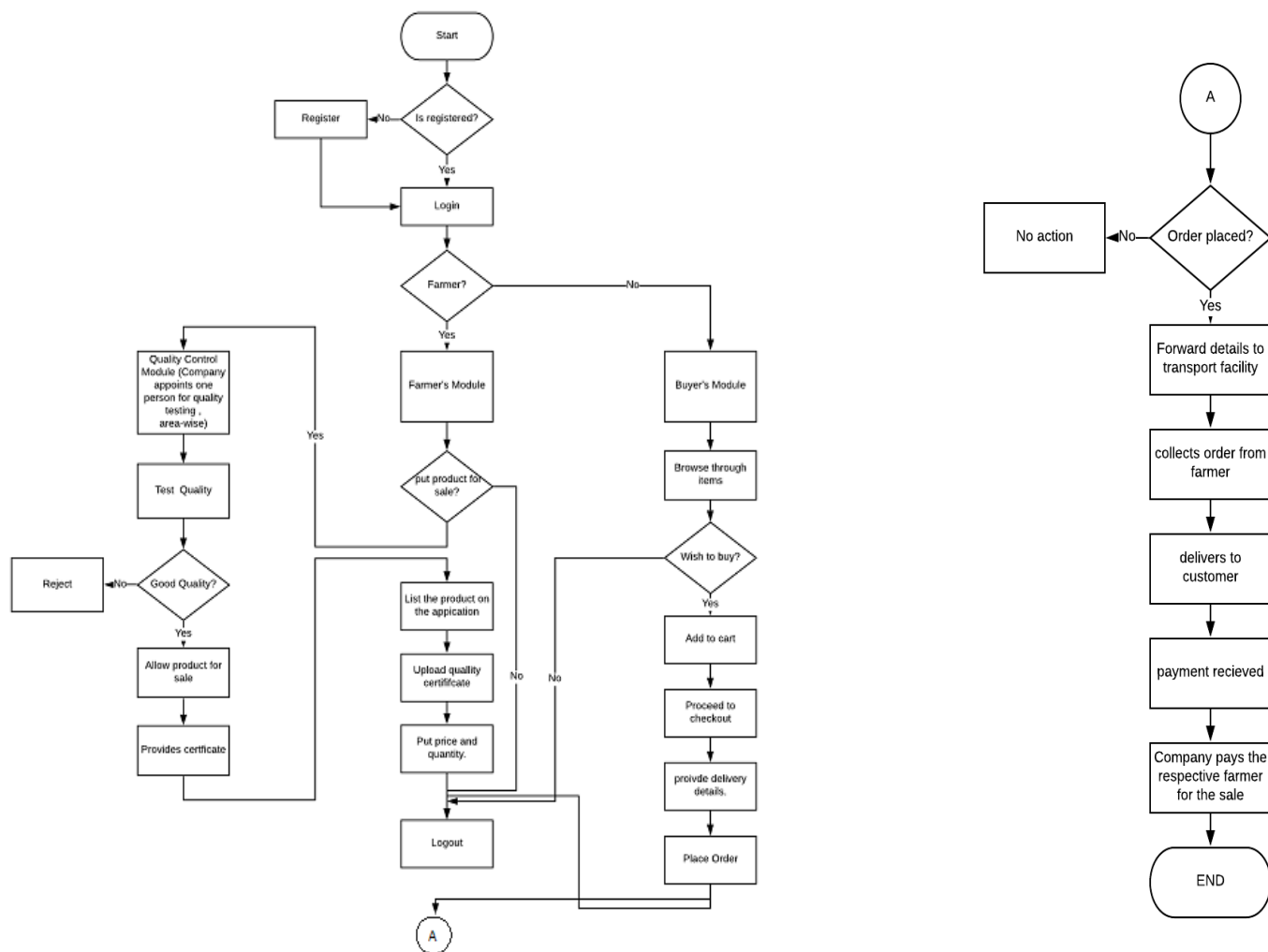
Figure 3.1 Flow of the System

3.1. Buyer Module

In the above figure 3.1, the representation of the system is explained. The system is divided into 3 modules; Farmer module, Buyer module and Quality Control module. The classification of the user will be done on the basis of registration. If the user logging in is defined as a buyer, the customer will browse through the products and select the ones of interest while stating its quantity. Once it's added to cart, the billing details will be filled out and the order will be placed. The transportation will be taken care of by the company and once the payment is revived, the customer will get the products and the transaction will be completed. Since the buyer will be directly connected to the farmer, the additional prices on the original product will be reduced to a large scale. The best quality goods only will be presented to the buyers, so the customer will receive A1 quality products at a reasonable rate. The buyer can book the quantity of the products and in a fixed time, the goods will be delivered to the buyer.

3.2. Farmer Module

If the user is defined to be a farmer, the farmer can locate different sections like 'uploading a product for sales, listing the harvested product or specifying the prices of the products'. The farmer will have the advantage of gaining profits they deserve for their hard work. They will list their production value as per the original market price and since the middlemen have been eliminated, the original market value will be divided into only farmers and the buyers. The farmers will price their goods based on their quality to be fair towards the buyers. In this module, the farmers will be connected directly to the retailers and the wholesalers. This module will eliminate the middleman and will allow the farmers to receive their desired price for the harvest. Quality assurance will be done to provide the best quality to buyers and also

give the best price to the farmers. This module will facilitate the farmers and the retailers, as none of the two parties will have to pay for the middle man. The farmers will have direct access to the market and the wholesalers will be able to trade with various farmers at a time.

3.3. Quality Control Module

The Quality Control Module is one of the most essential modules of the system as it helps decide an unbiased quality check of each harvest provided by the farmers. Every quarter new harvest will undergo a quality checkup where the harvest will have to pass a certain standard of quality. On the basis of the test, a quality certificate will be provided to the farmers for that particular harvest. Depending on the certificate grade, the prices of the products will be passed which must be obeyed by the farmers for better returns on their harvest. The quality of the crops will be tested by an individual appointed by the company. The quality is tested for the buyers to receive the guaranteed A Grade quality products by the company. The certificate received by the farmers will make them a trusted party to buy products. Only then the farmer will be listed on the application in front of the buyer.

4. Discussion

The proposed system is developed to acknowledge the socio-economic challenges in the agricultural industry. For centuries countries have been involved in trade of agricultural and food items in order to meet the domestic needs. Agricultural trade is a crucial part in reducing food insecurity across the globe [13]. Global trade in agriculture has more than tripled in value and doubled in volume since 1995. The figure shows the growth in agriculture trade over the period 1950-2016. This growth is majorly due to the increase in commodity prices over the years. As the trade level increases so will the need for domestic food increase [14]. By 2050, there will have to be enough resources to feed the 9.1 billion estimated populations in order to provide food security. Even so, in some developing nations, incentives offered on agricultural production by governments are very low hence leading to stagnation. And, stagnation affects growth.
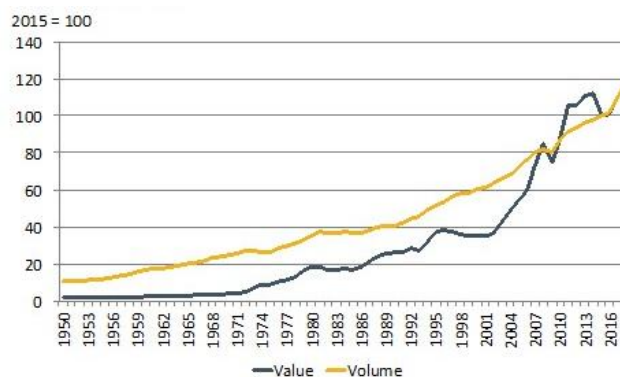

Figure 4.1: World Agricultural Exports

Figure 4.1[1], Farmers are the building block to the agricultural industry. According to a 2011 census, developing nations where agriculture is the main source of income, everyday 2000 young farmers give up farming and the reason being is that the income of a farmer is one-fifth of the economy of a non-farmer [15]. Moreover, maximum population involved in farming is above the age of 40. A few years from now, we might not get to see a next generation of farmers. How do we keep the manpower? [16] Generating good revenue for the farmers and providing them with a better life could be one of the ways to motivate the next generation to practice farming.

The system is made specifically for the betterment of the farmers to provide them with a lucrative career and transforming farmers as self-sustaining entities. The goal of the application is to present our farmers as entrepreneurs with an aim of eventually bringing a growth in the economy of the country. To achieve this goal, the system will act as a bridge between potential investors who are very keen in contributing to the agricultural industry and connect them to authorized needy famers. The main aim is to provide necessary capital to the farmers before the process of harvesting is started so

that they can carry out best quality agriculture. This will lead to the economic growth of the agricultural industry as a whole and social growth of the farmers. With the success of this system, farmers will also have a fixed profit margin.

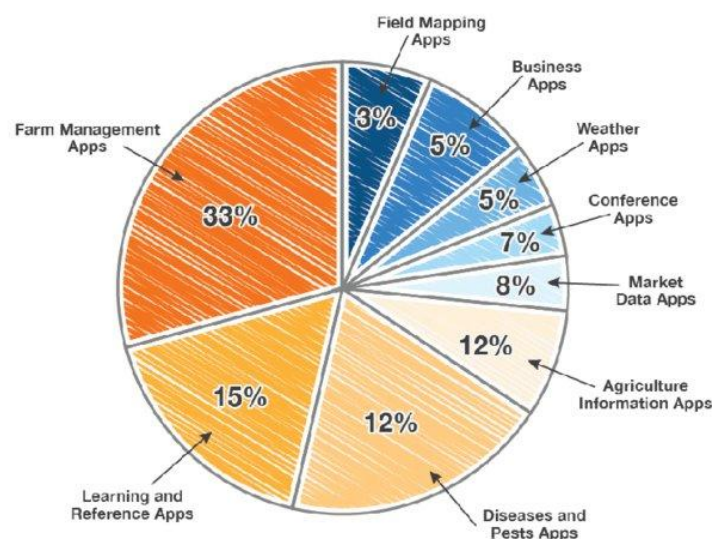**Figure 4.2: Harvest Process in agriculture industry**

Figure 4.3: Categories of systems in agriculture industry

Figure 4.2[22] explains the various stages included in the harvesting process right from planning of the crop to selling it in the market at a reasonable and rightful price. All the stages are equally important for a harvest to be called a

success, knowing the market and the need of the market. Carrying all the parts of the harvest to best abilities makes profits of one quarter and that decides the plan of the next quarter. To carry off a good harvest, there are applications developed to help boost the process of agriculture in order to bring the latest technologies and facilities to the farmers and help them produce better harvest every quarter. In order to do so, there are many different categories of applications developed as shown in figure 4.3 [22]. As seen in the pie chart, the majority type of application and systems developed are to help the farmers manage their farm. This is to show the farmers how to produce the best good in already available commodities and use them to their best capabilities. Next large amount is the learning and reference applications to provide right information to the farmers about their crops, land, fertilizers along with the market, different schemes available for them by the government to utilize them and ease their work a bit. Other system categories include disease and pest detection and prevention systems, informative applications, systems teaching the market and its data to the farmers, the weather detection system. [19] The least percent of applications are the ones developed for field mapping applications with 3% from the whole.

4.1. Comparison between proposed system and other systems:

The primary factor of the system is the farmers. They need to be provided with the best of facilities for fruitful outcomes. There are several applications available for the farmers to make their work easier or to carry out the best of agriculture. Comparing different systems might help better understand the need of this system in the agricultural industry. Below mentioned are some systems around the globe designed with an aim of benefitting the farmers.

Features	Fundly [24]	Cropital [25]	I Support Farming [26]	Maha Farm [27]	Farm Manager [28]	Krishi Villie [29]	Farmify [30]	AgroPreneurs
Year	2009	2015	2014	2018	2013	2011	2019	2020
Operating system	Website	Website	Android	Website	Android	Android	Android	Android
Multiple Language support	YES	NO	NO	NO	NO	NO	NO	YES
Category	Crowd-funding site	Crowd-funding site	Investment facility through partnership	Govt. provided schemes	Management of small farms	Updates of agriculture related commodities	Crowd-funding application	Crowd-funding + Ecommerce
Geographical Coverage	Multiple	Philippines	India	India	Greece	India	India	India
Capital Provided to the farmers	YES	YES	YES	YES	NO	NO	YES	YES
Facility for farmers to earn returns	NO	YES	YES	NO	YES	NO	NO	YES
Quality Assurance	NO	NO	YES	NO	NO	NO	NO	YES
Risk management	NO	NO	YES	NO	NO	NO	NO	YES
News Forum	NO	NO	NO	NO	NO	YES	NO	YES

Table 4.1: Comparison Between Different Systems around the world

As seen in table 4.1, various applications in the field of agriculture have been compared on the basis of a few characteristics to see the compatibility of them amongst each other. The features that have been considered for this comparison are the year in which the application was published to keep a note of year difference in the stated applications. Next is the Operating system with which the application is compatible. Language plays an important role in an application especially in the agricultural industry as not all users using a particular application might be comfortable with one single language common for the majority; hence multiple language support is the next feature in comparison. When considering applications built for any assistance or help for the farmers, there are different categories the assistance can be provided like crowdfunding, news portal, ecommerce, etc. These categories narrow down with respect to the motto of a particular application and system for how the system will be benefiting the farmers and the agriculture industry. Not all applications are developed for multiple countries to take advantage of it instead build for its local agriculture industry, whereas few are adaptable to any country and comfortable for any farmer to operate[33]. Hence the geographical coverage is one of the features in the comparison table. Majority of the systems as seen in the table 4.1 above, systems are providing any sort of capital to the farmers but there are no such facilities for the farmers to get their deserving returns too. Apart from these features, some facilities like Quality assurance, risk management and news forum are one of those features that create a trustworthy environment to the farmers and help them get better returns than usual.

As observed in table 4.1, AgroPreneur is not only providing capital to the farmers through crowd funding but also taking care of the farmers returns with help of ecommerce systems. This will help the farmers not only carry out their harvest at ease with investment but also get deserving returns through ecommerce systems. Not only have these, through quality checked module assuring the standards of the harvest, the chances of farmers having loss reduce. On addition, the news forum keeps them updated with any government provided schemes, new rules and any agriculture industry related information. Having risk management the investors and the farmers have a security in time of crisis such as natural calamities or draughts. Even though all these features might or might not be available in one application provide to the farmers, but the proposed system contains all the features to its best abilities for the farmers to carry out their harvest at ease and the investors to fund the farmers with least worries about returns.

5. Conclusion

Every increasing inflation and steady revenue has discouraged the farmers to continue agriculture as employment. This has reduced the employment rate in agriculture in India. One major problem faced by the farmers these days is the strict bounds of the economy, which is caused due to the low price for farm produce. Another major reason is the middlemen, who buy the crops at a very cheap price and add their unfair commission that results in overpricing the product in the market. The system aims at providing better revenue to the farmers. It works at encouraging the farmers to take up farming as their occupation. The system eliminates middlemen from the trade building a bridge between the farmers and the buyers. This helps the farmers to sell the yield at their desired rates and gain maximum profit out of it. The farmers develop direct ties in the market and the buyers are benefited by the best yield. It can be inferred that the system brings up the revenue of the farmers by cutting off the extra cost incurred at the middlemen.

Agriculture is the major source of income in most of the developing nations and it constitutes to 4% of worlds GDP[29].Apart from food and raw materials, it provides employment to the major percentage of the population. The economy in agriculture is stagnant, leading to young farmers dropping agriculture and choosing other occupations. Farmers are the building blocks of the agro-sector.[30] The proposed system aims at improving the economic conditions of the famers by connecting them with investors for finding monetary investments. The e-commerce module is to provide a better market reach for the farmers. The system ensures to provide the "right" price to the farmers. The proposed system would help in eradicating the persistent poverty and the inadequate market reach. The paper contains a comparative analysis on various systems and the proposed system. The comparative analysis helps understand the need of the hour in the agro-industry.

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