

AGRINET: A Comprehensive Solution for Indian Farming Community

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Abstract— Looking at the primary occupation of rural population (agriculture) in India and lack of advanced information available that can help them perform their job better, this paper proposes to provide agricultural knowledge products tied with relevant service models that would provide a value proposition for rural market. The value proposition thus offered would motivate a sizable number from the rural population to opt for this service and would result in increased sales of products to the market. This would also establish an entirely new business line providing for technology solutions in agriculture and related areas. The primary thrust of this plan is to outline the product and service offering and its stated value proposition to the customers and other stakeholders in the business.

Keywords-Internet of things; Agrinet; Application service providers;

I. INTRODUCTION

The **Internet of things (IoT)** is the [inter-networking](#) of physical devices, vehicles (also referred to as "connected devices" and "[smart devices](#)"), buildings, and other items [embedded](#) with [electronics](#), [software](#), [sensors](#), [actuators](#), and [network connectivity](#) which enable these objects to collect and exchange data[1][2][3]. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies"[3] and for these purposes a "thing" is "an object of the physical world (physical things) or the information world (virtual things), which is capable of being identified and integrated into communication networks"[4]. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of [cyber-physical systems](#), which also encompasses technologies such as [smart grids](#), [virtual power plants](#), [smart homes](#), [intelligent transportation](#) and [smart cities](#). Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing [Internet](#) infrastructure. Experts estimate that the IoT will consist of about 50 billion objects by 2020. This concept of digitized globalization is expanding in multiple dimensions of the

world community, examples of which are - smart cities, power sector, health sector, etc.

But unfortunately, not much work has been done till now, using the concept of IoT, in the area of Agriculture.

The biggest problem that is facing Indian farmer today is the ability to get the information regarding the crops and ability to get information regarding best price that he can get for his produce. The information revolution that is supposedly sweeping many areas of Indian society has left the Indian farmer almost untouched and his life has not changed much in last 10 year.

The good news is that new digital technologies now make it possible to collect and leverage huge amounts of critical data at minimal costs—thus making a farm's field operations more insight driven, and potentially more productive and efficient. This paper plans to bring real information revolution to the target market and help him take more informed decisions to maximize his profits.

India's approximately 20 million-line telephone network is one of the largest in the world and the 3rd largest among emerging economies. India has one of the fastest growing telecommunication networks in the world with system size (total connections) growing at an average of more than 20 percent over the last 4 years. Still one group of population that is seemingly completely left out of this growth is the rural population. Significant growth in last some years has come by way of mobile telephony which is best suited for taking the telecom networks to rural India.

Looking at the primary occupation of rural population (agriculture) and lack of advanced information available that can help them perform their job better, this paper proposes to

provide agricultural knowledge products tied with relevant service models that would provide a value proposition for rural market. The value proposition thus offered would motivate a sizable number from the rural population to opt for this service. This would also establish an entirely new business line providing for technology solutions in agriculture and related areas.

The primary thrust of this paper is to outline the product and service offering and its stated value proposition to the customers and other stakeholders in the business. Even though from the organizational stand point, the primary purpose is to increase sales, the business creates enough value at different point in value chain so as to motivate all the stake holders in the business.

II. THE CONCEPT

This paper intends to leverage the existing available technology to provide a solution that can be used for the above purpose. The product would use following already existing technologies and integrated them to provide this product and service. Technologies that would be incorporated in this product and service are as following:

- Mobile phone technology
 - GSM
 - CDMA
 - GPRS
 - CDMA Data
- WLAN
- Bluetooth
- Customer Relationship Management
- Global Positioning System
- Micro Sensors
 - Thermal Sensors
 - Chemical Sensors
 - Level Sensors
 - Moisture Sensors
 - Light Sensors
 - Movement Sensors
- Remote Sensing

There have been studies and position papers written on application of remote sensing technology in precision farming and need for precision farming itself¹[5]. There also have been studies of using GIS in small farms and dairy farms[6]ⁱ. Both these technologies, remote sensing and GIS, can be effectively used in providing information related to yield, forecasts etc to farmers.

A. Target Market

The target for this product is the middle to large farmer who is educated to some level and appreciates new technologies. Such farmer generally has access to television

and is not averse to using technology in farming. The farmer is also willing to change his crop pattern based on the inputs provided that would maximize his returns. In India the farmers have been classified in following categories. Over the years, land holding in India is getting more and more fragmented.

Table 1 shows the market size in numbers. As we can see from the table, if we choose farmers in category of medium to large we could target approximately 10 million² farmers[7].

B. Classification

This product and associated service require development and integration of technologies in a form that can be sold and deployed. At the same time there is a high degree of dependence on other components of the value chain and they need to buy into the idea.

Being a product and service offering, quite a few players are involved in the value chain of the business. Following are some of the candidates in the value chain:

1) Agricultural pricing information provider – This could be hundreds of markets across the country or a single information provider like Government of India³[8]. In any case we would have to have some information agreement with them.

2) Meteorological information providers - These are agencies that collect meteorological information, analyze the information and provide relevant information in a fashion so that it is ready for dissemination to the end customer.

3) Agriculture research information provider - This could be research institutions across the country, who based on the meteorological information, provide some kind of forecast regarding crop pattern for next harvesting season. These agencies should also provide remedies in case of serious meteorological events.

4) Raw material Provider - These are agencies that could receive the order for agricultural raw materials and dispatch the order to the villages. The dispatches need not be of urgent nature but need to be scheduled and sent to the doorstep of customer.

5) Application service provider - This is the main hub of the business, it would gather all the information and send the information to the relevant entities in the value chain. This entity would also be the front-end for the complete business.

6) Equipment Provider - The Company would provide equipment (sensors, mobile phones, applications etc) to the ASP which would be the prime contact for sale of this equipment.

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III. BUSINESS CONTEXT

The business would be represented by the entity called “Application Service provider”. The ASP would enter into agreements with all other entities and provide the product and service.

A. Players Involved

As depicted in Figure II, following players are involved in this business: 1) Application service provider is the front end for the business - ASP would enter into agreements with all the other players and would be single window contact for the consumers and other stakeholders. 2) Application and equipment provider – This entity is our company which has conceptualized the enterprise and would provide all the technology required for the operation. The involvement of this entity could be by virtue of licensing or joint venture. Application and equipment provider is referred to as “The company” in the report in many places. 3) Raw material provider – These are existing businesses that sell and market raw materials to the farmer. ASP would enter into agreements with them to provide raw materials to the farmer. 4) Research, Meteorological information provider – These are agriculture research organization or meteorological offices that can provide specialized information in their field. These organizations would be also consulted while making any forecasts. 5) Marketing and trading interface – This is the interface that would be used to facilitate marketing and trading of produce from the farmer. This would require tying up with local mandis or organizations like e-Choupal.

B. Technology Involved

The technologies involved in the product would be:

- Available mobile devices
- WAP Standards
- Mobile Networks
- Existing telecom and computer networks
- Micro sensor technology
- GPS
- GIS
- Remote sensing.

C. Industry

This product and service does not belong to a single existing industry but is a combination of agricultural, rural marketing, and telecommunication industry. The analysis of the industry is shown in Figure III. As we can see this business belongs to a nascent (more like non-existent)

industry. There has not been much innovation in the way the agriculture supply chain business is working. The main issue in this industry is the correct pricing of the product and service because the buyer is very price sensitive.

- **Strategic Content** : The product does not develop any new technology but requires a large number of existing technologies. Because of this a structure needs to be designed which can make multiple department resources work better. Also the venture needs help from different stake holders. The venture also fits into the broad strategy of the company by providing mobile applications and providing connectivity to information and resources that the farmer needs.

The company needs to leverage its partnership with existing ASPs to create ASPs who will eventually be the drivers of the business. Continuous innovation in terms of newer technology at lower price would be a key to success to that business. Getting patents on the developed technology would provide entry barriers to other players and would help us getting head start without competition.

D. SWOT Analysis

In SWOT analysis we will look at the strengths, weaknesses, of the company in doing this business and opportunities and threats that the company faces if it decides to do this business. The word “data” is plural, not singular.

- **Strengths**: The biggest strength of the company is its innovation in technology and existing relationships with operators and application service providers.
- **Weaknesses**: The biggest weakness of the company is its probable unwillingness to get involved in actual running of the proposed business. If the company gets involved, it would provide credibility and respectability to the business.
- **Opportunities**: There is a large market that is not using mobile phone technologies because voice is not good enough value for them to buy a mobile phone. If applications are provided to them that are pertinent to their business, it may lead to explosive growth in mobile sector. If we develop this business we can get an exclusive access to this market.
- **Threats**: Biggest threat is the threat of others doing it if we do not move fast enough.

IV. CONCLUSIONS

The venture is a complex integration of technologies, the company is one stop shop for all these technologies and the expertise to integrate all these technologies exists with in the company. Any other entity would find it difficult to integrate all these diverse technologies and deploy a solution in a reasonable time frame. This is one of the reasons why the

company would have to take a lead in developing and deploying this solution.

The venture would give the company complete monopolistic hold over rural market which with very pessimistic estimates is at least 10 million large. The market, once captured for mobile devices would exist for the company to deploy other products e.g. set top boxes for cable, security systems.

Competitors like e-Choupal are not following this path for business because even though businesses look similar in first instance, there is significant different in the main motivation of the stakeholders. ITC is doing e-Choupal for brand building and buying agri-products from source, while the company's motivation is to increase the use of technology for the benefit of farmers. Hence we are proposing a different path. Also with e-Choupal business, there is likelihood of the gram-sanchalak becoming a power base on its own, our model provides the power of information directly to each farmer.

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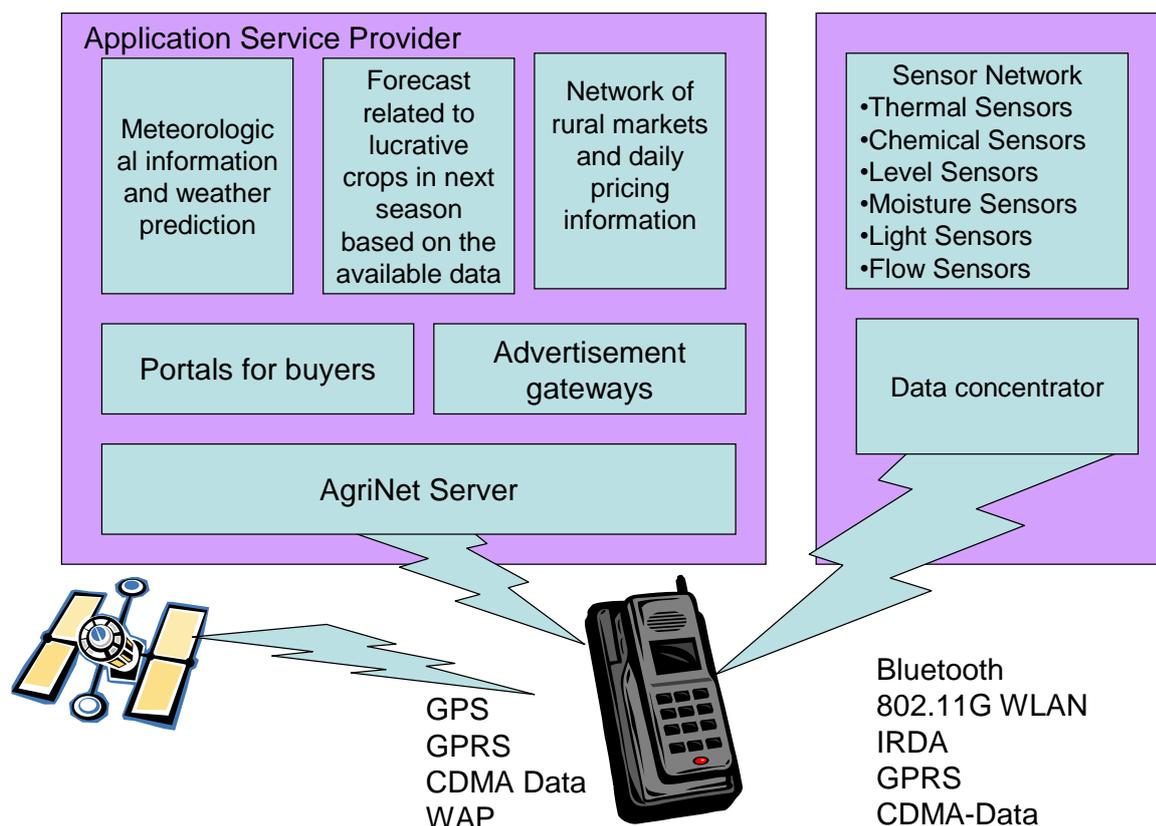


Figure 1. The basic concept of AGRINET.

TABLE I LAND HOLDING AND TARGET MARKET

| Category | Land Holding in Hectares | Number of farmers in millions |
|-------------|--------------------------|-------------------------------|
| Marginal | <1 | 50.12 |
| Small | 1 to 2 | 16.1 |
| Semi-medium | 2 to 4 | 12.5 |
| Medium | 4 to 10 | 8.1 |
| Large | > 10 | 2.2 |

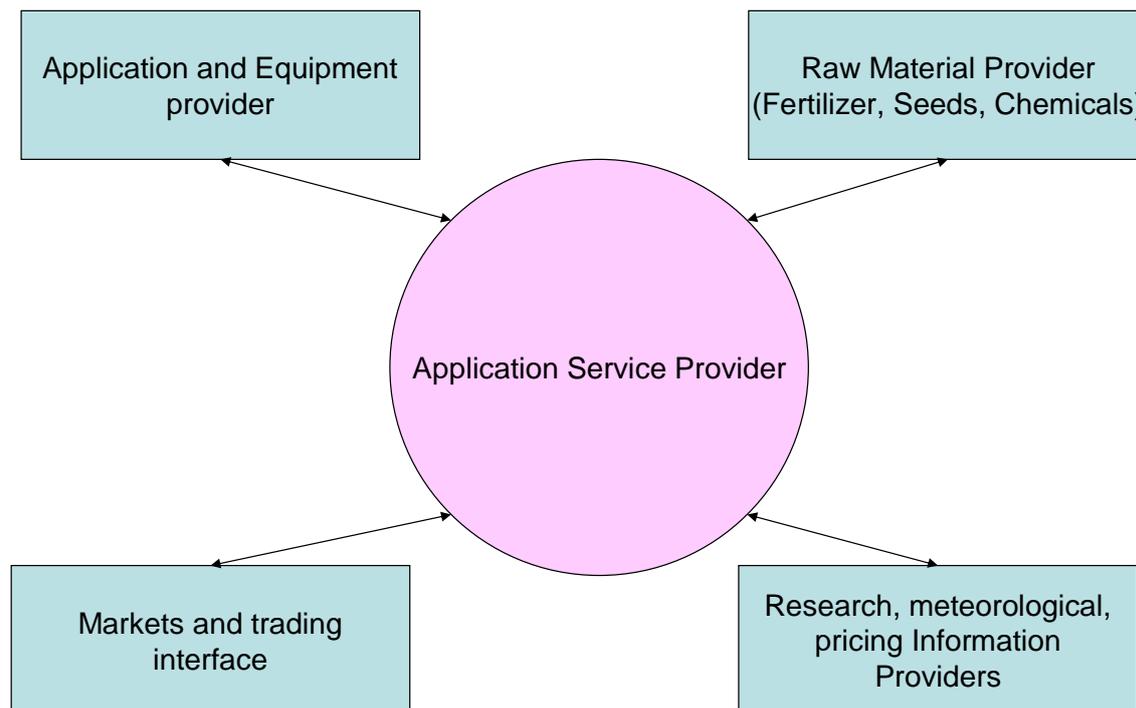


Figure II. The Application Service Provider