

PRECISION AGRICULTURE AND POTENTIAL MARKET IN INDIA

WHITE PAPER: RESEARCH INSIGHTS



There is a new green on the block, the digital green. A rather quiet revolution is happening in the field of agriculture i.e. precision agriculture (PA). In today's Internet of Things that rules the roost, precision agriculture (PA) is a fitting example of how diverse universes such as a farmland and software can be brought together through ICT.

When it comes to farming, yield, productivity and cost of cultivation are as good as the decision a farmer takes with the given data on the field. Now, what if the farmer gets to see all the data from his field and also gets help to take an informed decision? This is where ICT can help achieve the much needed boost of productivity in the Indian farmlands.

This paper examines PA methodology of Tech Mahindra, prominent case studies in India, PA technologies available in the global market along with opportunities, barriers and key strategies to take them to the Indian market.



What exactly is precision agriculture?

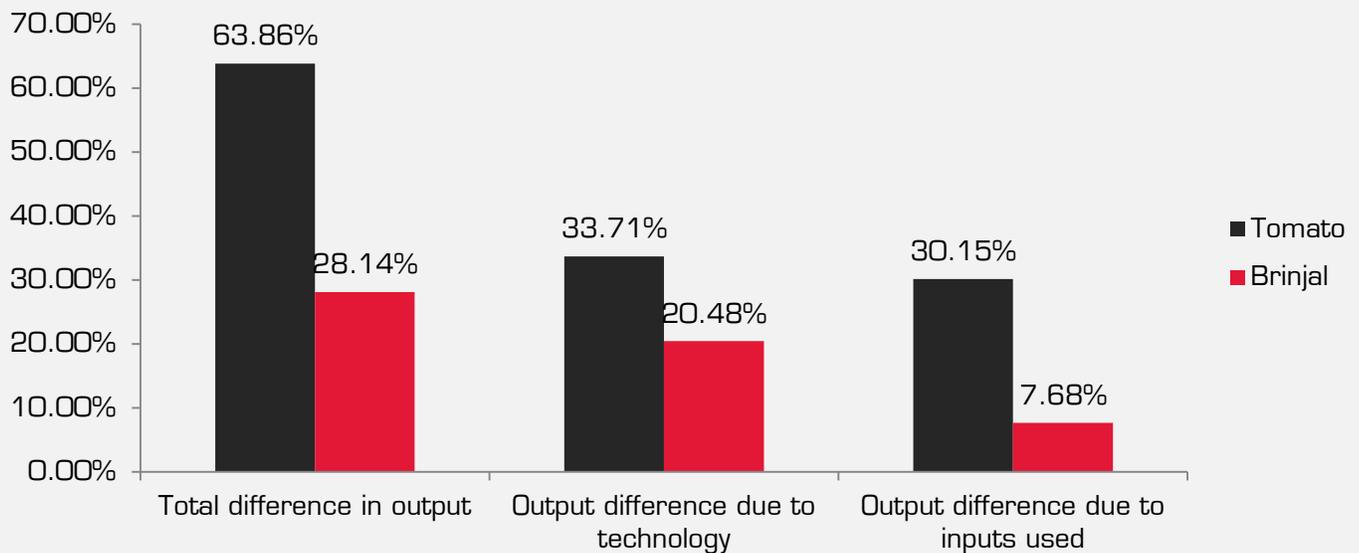
PA is farm management; typically the varied nature of the terrain of a farm would mean managing these with accuracy, which result in reduced inputs and costs subsequently growing more food. A farmer needs to take 40 odd decisions over a crop cycle, from pre-harvesting to post-harvesting phases. Precision farming helps a farmer reach an informed and a scientific decision in each of these 40 odd decisions he makes.

We, at Tech Mahindra have understood the challenges of today's farmer and have innovated a home grown solution - Farm Sensor®. Farm sensor® measures critical farm attributes at 3 different levels of a farm namely, the soil, the crop level and above the soil level.

At the soil level, we measure the impedance rate of the soil, moisture, water retention, NPK values and nutrient migration. At the crop level, we measure chlorophyll, susceptibility, plant level temperature and humidity. And at above soil level, we measure the weather conditions such as ambient temperature, humidity, dew point rainfall, etc.

The outcome of the solution is to record the different aforementioned critical attributes from the field and with the help of Big Data and Analytics predict, prescribe and warn the farmer of the inputs, diseases and weather conditions that help him take accurate mitigation or remediation; right when it is needed.

Productivity Difference in precision and non-precision farming



At the global market, PA solutions abound at different levels of the value chain. PA market comprises of technologies such as guidance systems, remote sensing, and Variable Rate Technologies (VRT). Guidance systems are divided into GPS (Global Positioning Systems) and GIS (Global Information Systems). Remote sensing is segmented into hand-held and satellite based sensing. VRT is segmented into variable rate fertilizer, variable rate pesticide, and variable rate seeding.

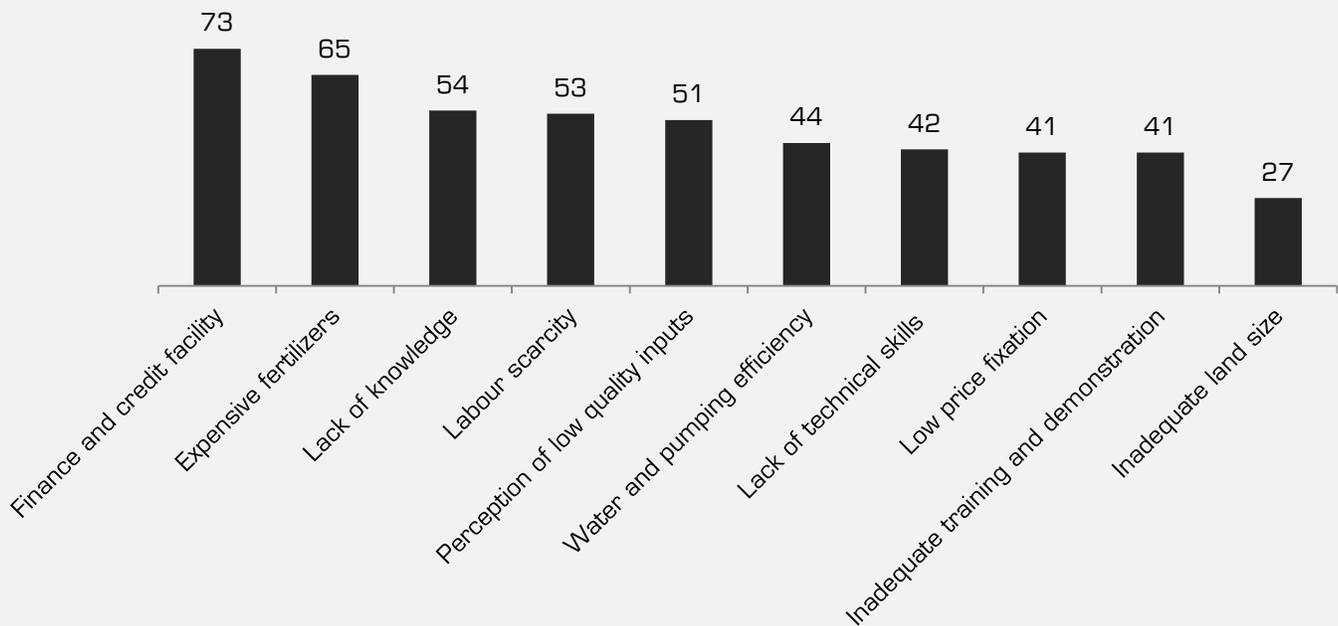
The lack of awareness and absence of dedicated education of PA among the farming sector is by far the major pain point for the market. Other issues include lack of standards and data management revolving around the PA industry.

When it comes to India, issues of agricultural sector range from low per capita productivity, absence of skilled labor, high cost of cultivation to insufficient soil management. With close to 200 million farmers in India, the need of the hour is to reach viable and cost effective solutions to the Indian market.

A study was undertaken to understand the impact of precision farming on resource-poor regions and underprivileged farmers. Specifically, the study has looked into productivity, income, employment, and adoption behavior of technology in agriculture. The study, conducted in the Dharmapuri district in Tamil Nadu, India, has collected data on precision and non-precision farming through the interview schedule during the year 2007. The study has revealed that adoption of precision farming has led to 80 per cent increase in yield in tomato and 34 per cent in eggplant production. Increase in gross margin has been found as 165 and 67 per cent, respectively in tomato and eggplant farming. The contribution of technology for higher yield in precision farming has been 33.71 per cent and 20.48 per cent, respectively in tomato and eggplant production. The elasticity of 0.39 for the adoption in tomato and 0.28 in eggplant has indicated that as the probability of adoption increases by 10 per cent, net return increases by 39 per cent and 28 per cent in tomato and eggplant cultivation. Lack of finance and credit facilities have been identified as the major constraints in non-adoption of precision farming. The study has suggested that providing of subsidies for water-soluble fertilizers and pump-sets will increase adoption of precision farming.

Constraints in Adoption of Precision Farming

Mean Garrett's Score



Some of the key challenges that need to be considered while taking PA to the Indian market are briefly shared below, quoting from Tata's case study:

- Conceptualizing ICT platforms have to be done after consulting the users. Agricultural practices are crop specific and region specific. ICT platforms have to be specifically customized for user needs
- Development of ICT platforms have to be done in a phased manner so that the project grows in an evolutionary manner. Starting the project in a pilot phase and then validating and expanding it, is the best way for making sure that a project concept works in real life
- The crucial aspect of ICT in rural areas is that the contact person should develop a working relationship and trust at the grass root level
- Designing ICT platforms for agricultural systems have to be done very systematically. Relationships have to be developed with the users and platform holders
- BIS Research estimates the global market size for precision agriculture to grow over \$6.34 billion by 2022 at an estimated CAGR of 13.09% from 2015 to 2022. The trends suggest that with U.S. at the forefront, North America will continue with its dominance during the forecast years. Also, with the world's most populous countries China and India, APAC will emerge as the fastest growing region in the market at a CAGR of 18.29% from 2015 to 2022
- In conclusion, Indian market is quite ready for introducing PA and the time is ripe with the government releasing a farmer-friendly budget for 2015. The only caution would be to select progressive states in which adoption of PA is easy to start with
- The way forward is to develop cost-effective solutions keeping in mind the challenges an Indian farmer faces in the real world. Soil management, productivity challenges and optimizing inputs are just a few challenges that can make a difference to the science of food production in one of the oldest democracies of the world

Source of Information/ Reference:

- Market Source: ASD reports (<http://www.hortibiz.com/hortibiz/nieuws/precision-farming-to-become-a-634bn-industry/>)
- Dharmapuri study source: Ideas (<https://ideas.repec.org/a/ags/aerrae/47892.html>)
- Source of Tata case study: http://planningcommission.nic.in/reports/sereport/ser/stdy_ict/12_tatakisan.pdf
- Market data: <http://www.marketsandmarkets.com/Market-Reports/precision-farming-market-1243.html>
- Source for Challenges: <http://www.hortibiz.com/hortibiz/nieuws/precision-farming-to-become-a-634bn-industry/>
- More reading on PA:
 - <http://www.nortonrosefulbright.com/knowledge/publications/120848/precision-agriculture-on-the-global-stage>
 - http://www.navigopedia.net/index.php/Precision_Agriculture

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Tech Mahindra is a specialist in digital transformation, consulting and business re-engineering solutions. We are a USD 3.5 billion company with 98,000+ professionals across 51 countries. We provide services to 674 global customers including Fortune 500 companies. Our innovative platforms and reusable assets connect across a number of technologies to deliver tangible business value to all our stakeholders. Tech Mahindra is also amongst the Fab 50 companies in Asia as per the Forbes 2014 List.

We are part of the USD 16.5 billion Mahindra Group that employs more than 200,000 people in over 100 countries. Mahindra operates in the key industries that drive economic growth, enjoying a leadership position in tractors, utility vehicles, information technology, financial services and vacation ownership.

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