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Special Issue

elets Cotton & Agro Commodities  
**MARKETING**  
Innovation Summit  
Innovation in Cotton and Agro Commodity Markets  
CONFERENCE | AWARDS | EXPO  
MUMBAI, 23 July 2019

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**B I G F A B**

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6

THE GAME CHANGER OF COTTON  
& AGRO COMMODITIES MARKETING

**MAHARASHTRA  
SHOWS THE WAY**



**SHRI DEVENDRA FADNAVIS**

Hon'ble Chief Minister  
Maharashtra





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Founded in 2005, eGov magazine is published in both print and online formats. Innovative use of ICT in Governance is at the heart of our all eGov initiatives.

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OF THE MONTH

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It compiles ICT-related advancements being introduced, exercised by various government organisations via eGovernance module.

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## > INTERVIEWS

This section highlights various stakeholders, bureaucrats and policy makers influencing governance in the country.

## Maharashtra leads the way in bringing innovations to Cotton & Agro Marketing sector

Maharashtra, the third largest state in India, financial capital and the second largest producer in cotton is one of the pioneers in leveraging technology and innovation to result in an improved contribution in the state's economy. By successfully adapting the Government of India's model of National Agricultural Market (eNAM), Agriculture Produce Market Committees (APMCs), MARKNET projects etc., Maharashtra is adding Rs 7,500 crore to the economy.

To showcase and derive the learnings and success mantras of the Maharashtra Agro Marketing model, the Government of Maharashtra and Elets Technomedia are organising the first ever National Agro Marketing Summit in the state's capital, Mumbai on July 23, 2019.

In light of the Summit's theme, the cover story of the special issue of eGov magazine brings forth the comprehensive structure and functioning model of the Maharashtra State Agricultural Board, which not just talks about the state's major agro produces and marketing strategy, but also how IT and ICT have contributed towards curving new heights of growth charter along with empowering the agrarian society through models like APMC and e-auctions.

The issue is also graced with special message by the Honourable Chief Minister of Maharashtra, Shri Devendra Fadnavis, in which he stresses on the Government of Maharashtra's vision on technology and better synergy between various stakeholders in the sector.

Programme Mentor Anoop Kumar, Principal Secretary, Co-operative and Marketing, Animal Husbandry, Dairy Development & Fisheries, Government of Maharashtra, in his special message, shared the overview of the Agro Marketing sector of Maharashtra including the achievements and areas of improvement.

The special article by Programme Chairman of the Summit, Nawin Sona Natesan, Secretary to Government of Maharashtra, and Managing Director, Maharashtra State Cotton Growers' Marketing Federation Ltd. Mumbai, presents a comprehensive perspective on the how technological innovations can be leveraged within the existing system of the sector.

The magazine also brings a pan India perspective on the Agriculture and Marketing sector through a bouquet of interviews and articles from state government officials of Jammu & Kashmir, Himachal Pradesh, Tripura, Arunachal Pradesh, Bihar and Gujarat.

With the advent of new technologies, policies and schemes related to the Pledge loan to farmers, the Maharashtra Government aims to ensure transparency in the system along with empowering the stakeholders of the agro marketing sector through eradicating middlemen from the overall transaction process to bring ease in doing business.

Our endeavour at eGov magazine will be to keep our esteemed readers posted on the latest developments in the sector and contribute our bit towards a prosperous agrarian society.



रवि गुप्ता

**DR RAVI GUPTA**

Editor-in-Chief, eGov magazine, and

Founder Publisher & CEO,

Elets Technomedia Pvt Ltd



**Devendra Fadnavis**

Chief Minister  
Maharashtra



Mantralaya  
Mumbai 400 032

16<sup>th</sup> July 2019

## MESSAGE

I am happy to know that the Department of Marketing and Maharashtra State Coop Cotton Growers Marketing Federation Ltd, who along with Elecs Technomedia Pvt Ltd, are organizing Marketing Innovation Summit in Mumbai on July 23, 2019.

Riding on the back of radical reforms in storage, logistics and financing, the Indian agriculture commodity market is on the cusp of change. However, before we leap forward, we need to resolve some critical issues, such as establishing and governing of markets for agro commodities; setting trade standards, stabilizing transaction methods and enabling wider market access through a defined roadmap from a policy and regulatory perspective.

Government of Maharashtra has the vision that technology and better synergy between various stakeholders in the sector hold the key to address these issues and transform the agriculture commodity market, which has huge room for growth and potential to create millions of employment opportunities. It is noteworthy that Maharashtra has been ranked No. 1 in the country in the "Agricultural Marketing and Farmer Friendly Reforms Index" in 2019.

Maharashtra has a vast Agro Market which adds Rs 75,000 crore per annum to the economy with the largest area in the country under cotton, adding annual value of Rs. 46,400 crore, Maharashtra can be a global leader in cotton. This area stands to benefit immensely if technology is leveraged innovatively to help farmers with an effective agro commodity marketing ecosystem.

I hope that the Marketing Innovation Summit will help in mapping the role of agro marketing in the vision of a Trillion dollars economy for Maharashtra in the future.

I wish the delegates, dignitaries, and organizers a great success.

(Devendra Fadnavis)



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The Marketing Innovation Summit, which is being organized in Mumbai on July 23, comes at a time when the Government of Maharashtra is actively looking at further improving the policy and regulatory framework in the state to address various issues impacting farmers in order to boost their income through technological interventions and innovative measures.

Maharashtra has taken major steps by amending the APMC Act in respect of marketing reforms. As on today, more than 1000 Direct Marketing licenses have been issued of which 400 licenses are issued to the farmers Producer Companies. 57 Private Markets have been established in the State as against 307 Agricultural Produce Market Committees. This has opened up the sector to competition and encouragement of better services to farmers. Private entrepreneurs have brought more than Rs.150 crores investment in the Private Markets and have created modern infrastructure and other facilities for marketing of agricultural produce.

Also notable is that Maharashtra has 60 APMCs in the e-NAM ; a vibrant presence of commodity exchanges. The Govt. of Maharashtra is actively involved in Market led equitable income to farmers, and an innovative marketing ecosystem is an essential step for the same.

The Department of Marketing, Government of Maharashtra and the Maharashtra State Coop Cotton Growers Marketing Federation Ltd (MSCCGMF) are playing a critical role in achieving the government's objectives of infusing new vigor in the agro commodities market and cotton sector in the state and providing a level playing field to farmers in marketing their agro produce.

I am sure that the Marketing Innovation Summit will provide an opportunity to all stakeholders to come together and initiate a dialogue to address current challenges and help develop a road map for the future of the commodities market in Maharashtra, which is at the forefront in producing cotton and other agricultural commodities that are pivotal for the growth of India and the world.

I am happy to note that EletsTechnomediaPvt Ltd, the joint organizer of the summit and publisher of eGov, will launch a special issue of the magazine on this occasion to highlight the voices of decision-makers, key industry players and other important stakeholders to help us understand the key challenges faced by the commodity sector and innovative ways to resolve them.

I take this opportunity to wish all the participants a big success at the Marketing Innovation Summit.

( Prof. Ram Shinde)





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Date : **16 JUL 2019**

I am delighted to learn that the Department of Marketing, Government of Maharashtra and the Maharashtra State Co-op. Cotton Growers Marketing Federation Ltd (MSCCGMF), in association with Elets Technomedia Pvt Ltd, is organizing the Marketing Innovation summit in Mumbai on 23 rd July 2019. The summit Presents a big opportunity for various stakeholders of the agro commodity market to engage in meaningful dialogues to contribute towards the growth of this sector of national importance.

Maharashtra is constantly striving for excellence to help the farmers market their products. But there are existing challenges in this sector. The digitization of farmers land records, sale of agriculture produce on a digitize exchange, effective use of technology and innovation for the agro sector, strengthening of the agro-economy with conducive policies and its implementation are the need of the hour to ensure building an effective agro commodity marketing ecosystem.

The summit has been conceptualized keeping these challenges in view and will see participation from stakeholders covering the entire value chain of the agro commodity market, who will deliberate on various innovative ways to address the existing challenges.

The platform will also see the launch of a special edition of eGov Magazine, representing perspectives of various stakeholders. I congratulate the organizers of the Marketing Innovation Summit and wish them all the best.

(Sadabhau Khot)



## MESSAGE

Market architecture in respect of agriculture commodities including Cotton so far has been quite lopsided with major focus on traders & wholesale markets i.e. APMCs, which are in fact far from the farmer's farm gates. Over the years, these APMCs have turned out to be highly regulatory and restrictive in their market practices. It is realized that transactions at these APMCs between farmers and traders & commission agents is very asymmetrical with farmers having very little or no bargaining powers. Very few farmers have the capacity to link their produce to terminal destinations and intermediate market players deprive them from appropriate remunerations by keeping them outside of the consumer markets. This vicious cycle has been responsible for depriving farmers & primary producers of optimal or market linked price realization. Hence, need has been felt of a new market architecture which is more farmer friendly and could help boost farmers real income.

Structural marketing reforms to unshackle farmers from monopolistic compulsions created by State APMC Acts and enhance their market access and better price realization through enhanced competition in the sphere of Agriculture Marketing has been catalyzed by circulation of Model APLM Act in 2017 by DAC & FW, GoI. It is a very challenging & formidable task

Maharashtra has done path breaking work of promoting direct marketing. Enabling environment has been created in the state to facilitate by bringing amendments in the APMC act so that any Person, Partnership firm, Cooperative Society, NGO, Local/Govt body and Company is eligible for direct marketing license. Till date, total no of 1064 Direct Marketing Licenses have been given out of which 400 licenses have been issued to the Farmers Producer Organizations (FPOs) and their total turnover has exceeded Rs. 2800 Cr. Rise of FPOs and FPCs has proven to be game changer in the sphere of agricultural marketing. The State is totally committed to carry out holistic structural Market reforms and is taking resolute steps towards that direction. The State APMC Act was amended in Maharashtra through an ordinance promulgated on 25<sup>th</sup> October, 2018 after incorporating all the important provisions suggested in the Model APLM Act, 2017. The Maharashtra Agriculture Produce and Livestock Marketing (Promotion & Facilitation) Bill was tabled and passed by the State Assembly in November, 2018 but presently it stands referred to Cabinet Sub-Committee.

Agriculture marketing sector needs to gear up to new challenges of adapting to changes in policy focus and turn more towards being a service provider of services like assaying, grading, marketing information dissemination to the producer sellers. There is immediate need of adapting the best practises associated with E-NAM. Innovative thinking and embracing the new technology is the new mantra. In this background, coming together of all stakeholders in "Marketing Innovation summit" being organized by Maharashtra State Cotton Growers Marketing Federation and Department of Marketing is a welcome initiative. I am sure, this conference would churn out series of innovative ideas which will expedite the much needed agriculture marketing reforms in the country.

*Anoop Kumar*  
(Anoop Kumar, IAS)

Principal Secretary (Marketing)  
Co-operation, Marketing and Textiles department  
Government of Maharashtra, Mumbai



# CONTENTS

10



## Maharashtra shows the way in tech-led cotton & agro commodities marketing

### INTERVIEWS



#### 28 PANDURANG POLE

Secretary of Food, Civil Supplies and Consumer Affairs, Government of Jammu and Kashmir



#### 30 B M JOSHI

Managing Director of Gujarat State Agriculture Marketing Board



#### 32 NAND KISHOR

Director Horticulture-Cum - Mission Director, Government of Bihar



#### 38 CD MUNGYAK

Director, Department of Science and Technology Arunachal Pradesh



#### 46 PRASANNA SARAMBALE

Data Centre Business & Group Head- Business Development at Sterling & Wilson

### FEATURES



#### 14 Innovation in Marketing of Cotton and Other Agro Commodities: BIGFAB 6 and Business Process ReThinking

34 Root Identification and Systematic Monitoring System May Lead to Success in Marketing



#### 42 Himachal Pradesh Progressing Towards Technology-Enabled Agro Produce and Procurement

49 India Reiterates Support for Afghanistan's Regional Security and Prosperity at SCO Summit



#### 22 AI in Agriculture







COVER STORY

# MAHARASHTRA SHOWS THE WAY IN TECH-LED COTTON & AGRO COMMODITIES MARKETING

MAHARASHTRA, THE THIRD LARGEST STATE IN INDIA AND THE SECOND LARGEST PRODUCER OF COTTON, HAS NOT ONLY PIONEERED IN THE AGRO PRODUCE SECTOR BUT ALSO CREATING A FOOTHOLD IN THE AGRO MARKETING ARENA BY LEVERAGING TECHNOLOGY, WRITES **SREETAMA DATTA ROY, SOUVIK GOSWAMI & HARSHAL DESAI** OF **ELETS NEWS NETWORK (ENN)**.







**M**aharashtra, the commercial capital of the country is not only a pioneer in the finance sector, but also kept a strong foot forward in the technological innovation for procurement purpose as well. With an annual addition of Rs 7,500 crore in the state's economy, Agriculture is the major contributor in the growth of primary sector.

### Major Agro Produces of Maharashtra

According to the Ministry of Agriculture, the principle crops grown in the state are rice, jowar, bajara, wheat, tur, mung, urad, gram and other pulses. The state is major producer of oilseeds. Groundnut, sunflower, soybean are major oil seed crops. Important cash crops grown are cotton, sugarcane,

*In a bid to develop a direct marketing system and get away of the mediators in the process, MSAMB has introduced Agri-Business Development system, a scheme which enables the farmers to improve income and deal directly with the consumers in the online or physical marketplaces.*

Cotton per annum, out of the 340 lakh bales p.a. of India. The state has an area cover of 39 lakh h.a for Cotton cultivation."

With an objective to coordinate the market functioning of market committees, the Maharashtra State Agricultural Marketing Board was set up in 1984. The Board is instrumental in the state level planning of the development of the agricultural produce markets.

### Export Scenario of Maharashtra

MSAMB states that the major countries in which the fruits, vegetable and food crops are exported include Europe, USA, South East Asian Countries, Japan, and Middle East Countries. Some of the major export products are:



turmeric and vegetables. The state has an area of 10.91 lakh hectares under various fruit crops like mango, banana, orange, grape and cashew nuts etc.

Maharashtra is the second largest producers of cotton with

22.21 percent of the total produce in India.

Nawin Sona Natesan, Secretary to Government of Maharashtra and Managing Director, Maharashtra State Cotton Growers' Marketing Federation Ltd. Mumbai says, "Maharashtra produces close to 88 lakh bales of

**Mango:** In the last mango season 2018 about 1881 Mts of mangoes have been processed for the purpose of exports to various countries. MSAMB has promoted the partnership organisation of primary co-operative societies named "Mahamango" for export promotion of mangoes.







**Grapes:** The MSAMB promoted an organisation called MAHAGRAPHES to boost the export of grapes. MAHAGRAPHES is regularly exporting around 100 -120 containers to Europe and Middle East.

**Pomegranate:** MSAMB has exported 1.85 Mts pomegranates to UAE and there is a rising potential of export of the fruit in the USA as well.

**Mandarin:** MSAMB has developed a export facility centers at Karnja and Varud Amaravati for Nagpur Mandarins (loose jacket orange) and exported to Sri Lanka and Gulf countries.

### Technology deployments and innovations in the Maharashtra Agro Marketing Sector

Maharashtra has taken several initiatives to deploy technology in the agro marketing and procurement processes. Some of the technology deployments are as follows:

- **MARKNET Project:** MARKNET refers to computerised Agricultural Produced Market Committee (APMC) of the state. "Objectives are

*MSAMB has also launched Maharashtra Agricultural Competitiveness Project (MCAP), which is assisted by World Bank and implemented by Maharashtra State Government in 2010. The objective of the project is to increase the productivity, profitability and market access of the farming community in the State of Maharashtra.*

to compile market arrivals, prices & dissemination of the same and bring the effectiveness and transparency in the functioning of APMCs, for benefit of the farmers. Computer set with internet facilities has been provided free of cost to 294 Main markets and 66 sub yards," says MSAMB.

- **National Agriculture Market (eNAM):** The Government of India has launched the online marketplace, which helps the agrarian community to take part in computerised auction process (e-Auction) at APMCs.
- **ERP and MIS:** The Enterprise Resource Planning and Management Information System are utilised to compile information and generate summary reports for all procurement and transactions of the Board.
- APMC computer operators are provided an incentive of Rs 1,000 to enter and update data on the MSAMB website under Marketing Research and Information Network Scheme of DMI. "Till date Rs.69.05/- Lakhs incentive has been distributed to computer operators of APMCs," states MSAMB.
- Statistical information database is maintained for the APMCs and the reports are further sent to the State and Central Governments for creating or updating schemes.

MSAMB has also launched Maharashtra Agricultural Competitiveness Project (MCAP), which is assisted by World Bank and implemented by Maharashtra State Government in 2010. The objective of the project is to increase the productivity, profitability and market access of the farming community in the State of Maharashtra. Out of the total project cost of Rs







875.35 crore, World Bank share consists of Rs 632.12 crores (72.21 percent), Govt. of Maharashtra share of Rs 70.69 crores (8.00 percent) and the remaining share is of beneficiaries i.e. Rs 172.53 crore (19.79 percent).

One of the major aspects of this project is the adoption of computerised auction system to bring more transparency in the system. The APMCs have also brought in operational reforms within themselves by computerised recording of arrivals of agricultural produce in the APMC and also adopting a uniform accounting system.

### **Agri-Business Development - a step towards eradicating mediators**

In a bid to develop a direct marketing system and get away of the mediators in the process, MSAMB has introduced Agri-Business Development system, a scheme which enables the farmers to improve income and deal directly with the consumers in the online or physical marketplaces.

MSAMB creates a direct link between

*According to the Ministry of Agriculture, the principle crops grown in the state are rice, jowar, bajara, wheat, tur, mung, urad, gram and other pulses. The state is major producer of oilseeds. Groundnut, sunflower, soybean are major oil seed crops. Important cash crops grown are cotton, sugarcane, turmeric and vegetables.*


farmers and consumers by organising fruit and grain festivals. "Through these festivals, consumer get fresh fruits and grains and farmers get 30 to 40 percent higher monetary benefits. These festival can be organized by APMC, Co-operative societies related to agriculture and marketing, different departments of Govt. and Farmer Producer Companies," MSAMB states.

### **Role of BIGFAB6 in Maharashtra Agro Marketing Scenario**

Natesan shares the role of the emerging technologies such as BigData, Internet of Things (IoT), Geographic Information System (GIS), Finance & Technology (FinTech), Artificial Intelligence (AI) and Machine Learning (ML), and Blockchain, which he named BIGFAB 6, and how it can be leveraged to contribute towards the growth charter of the sector.

He says, "By leveraging each technology for its USP, the sector of Agro Marketing can phase transform from 20th century trade practices into the 21st century of efficient market economy. For e.g. AI systems can be built for grading and sorting, quality assurance ecosystem. High quality visual analytics has been developed for sorting Tea Leaves."

Further stating possible roles of technologies like IoT and Blockchain, Natesan adds, "The IoT sensors would keep track of fumigation, humidity, pest - also about movement etc. Sensors would trigger events. The quality certificates, inspections and other documentation itself could be on a blockchain."

Maharashtra, the third largest state of India epitomises the agro marketing sector and leveraging the technology to not only contribute towards the state's agricultural vis-a-vis- economic growth, but also creates a transparent and all inclusive platform to empower the agrarian society. 





# INNOVATION IN MARKETING OF COTTON AND OTHER AGRO COMMODITIES:

## BIGFAB 6 and Business Process ReThinking

Agriculture marketing in Maharashtra is set for a major transformation on the back of technological innovations and carefully crafted policies to further boost agriculture's contribution to India's economy. **Nawin Sona Natesan**, Secretary to Government of Maharashtra, and Managing Director, Maharashtra State Cotton Growers' Marketing Federation Ltd, Mumbai, presents a comprehensive perspective on the existing challenges for agriculture marketing in the state as also the way forward to tackle them in light of emerging technologies that are set to bring a paradigm shift to the sector.



**Nawin Sona Natesan**

Secretary to Government of Maharashtra, and Managing Director, Maharashtra State Cotton Growers' Marketing Federation Ltd, Mumbai







The agro market in Maharashtra adds Rs 75,000 crores each year to the economy through a network of government-backed Agricultural Produce Market Committees (APMCs), private APMCs and Direct Marketing Licensees (DMLs). Each commodity has its own value chain, thus adding a multiplier effect to the economy of the state and the country. The cotton market itself trifurcates into 400 lakh quintal of seed cotton per annum valued at Rs 20,000 crores, cotton seed valued at Rs 6,000 crores and 88 lakh bales per annum totalling Rs 46,000 crores. However, presently the challenge is how to leverage existing and emerging technologies (BIGFAB 6 – BigData, IoT, GIS, FinTech, AI and ML, and Blockchain), and 'ReThink' known business scenarios to steer the economy towards higher growth.

#### Commodities - Cotton and Others

Maharashtra generates a huge quantity of cotton, a key global commodity, and various other agriculture produce of national and international significance. The state has 39 lakh hectares under cotton with an annual output of close to 88 lakh bales out of the 340 lakh

*The vibrant APMC network and the pioneering reforms in the sector have created avenues for good price discovery, improved physical infrastructure, reduced transportation costs, and the state is gradually moving towards better services to farmers.*

bales per annum of India. Besides countless farm labourers, more than 22 lakh farmers are engaged in cotton production in the state. The state hosts 860 ginning pressing factories, which produce the bales consumed in various parts of the country, largely by the spinning mills in South India. Maharashtra cotton is also exported to

countries like China and Bangladesh.

The vibrant APMC network and the pioneering reforms in the sector have created avenues for good price discovery, improved physical infrastructure, reduced transportation costs, and the state is gradually moving towards better services to farmers. Maharashtra's encouragement of private marketing licenses and DMLs are creating the much needed competition to enable long-term cost efficiencies, and better services, incentives to farmers and intermediaries.

It is a matter of pride that Maharashtra Department of Marketing's constant and pioneering efforts have been duly recognised by NITI Aayog, which has ranked the state No. 1 in the country in its Agricultural Marketing and Farmer Friendly Reforms Index (AFFMRI) with a commendable score.

Building on this foundation, there is a need to map out the next steps, a road map for plugging the policy gaps, identifying the business needs, the industry demands, and setting them in the context of the larger Indian economy.





### Layers of Commodity Markets: The Produce, The Consumer and The Derivative

Commodities are transacted upon in many layers:

- **Farm level:** As "produce" is unclassified, mixed, fragmented, contaminated, and varying in location and time (harvest), and ownership
- Segregated, assayed and graded produce at market, of better uniformity, amenable to price assignation, collective handling, packing, etc.
- Intermediate consumable: where the raw produce with some value addition is converted into a raw material for the industry up the value chain. For example, raw cotton (seed cotton) is not a global commodity, but the cotton bale is. It is the raw material for spinning units and is exported.
- Trade-able commodity: near fungible assets which can be traded physically or electronically, say, packaged and processed agro produce
- Commodity derivatives: forward, futures, ETCs, swaps, etc.

**Hence, there are many "layers" of the same economy based on the same products.**

### *Cotton itself is a vast subject and field. The Government of Maharashtra and the World Bank together are in the process of launching a Rs 2000-crore, seven-year programme—the SMART State of Maharashtra Agriculture and Rural Transformation Project.*

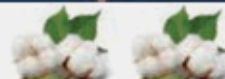
The simplistic notion of a value chain is too linear and sequential to appreciate the vastness and complexity of each layer. There is very little in common between the market at the farm gate, the market at the mandis, the market at the pre-processing stage, and most of them have little relation to the derivatives that drive the economy at the higher end.

Seeing this market stratification, one realises the presence of a highly sophisticated, top end Commodity derivatives market, which is enormous, highly regulated, monitored, tech-enabled, and integrated into the banking system. If there are physical settlements, then there is backward integration into logistics, warehousing and other services like collateral management, assaying, etc.

But as we dive deeper down the value chain, the picture becomes murkier. Each one of the product presents a very staggering variety of market sophistication. Let me illustrate. Market Assessment ToolKit :

In my opinion, a market maybe characterised by some key indicators:

1. **Size of the market/value:** the amount of produce it throughputs, its carrying capacity, and associated market-capitalisation
2. **Geographical Spread**
3. **Buyer-seller profile:** numbers, location, limits on trading, qualifications/registration, and taxation requirement
4. **Market entry characteristics of sellers-buyers:** easy or difficult to enter the market, resistance
5. **Market information:** availability and access
6. **Product differentiation:** choice for buyers
7. **Product standardisation,** quality assurance and assaying
8. **Trading mechanisms:** physical or electronic, primary or secondary (resale possibilities of same produce in same or different market).
9. **Transaction settlement systems:** formal or informal, credit-based or cash and carry.
10. **Level of Intermediation:** can produce be bought without brokerage, or other intermediaries?
11. **Dispute resolving mechanisms:** formal, informal or non-existent.
12. **Risk profile of the market:** are there





inherent risk mitigation mechanisms in the market—informal or formal?

13. **Regulation ecosystem:** for derivatives it is SEBI, for example
14. **Technology presence vs. human intervention:** how much automation and what level of dependence is on human (subjective judgment)?
15. **Variety and availability of supporting services:** financial like insurance, or physical like assaying
16. **Network connectivity:** integration with other markets – regional, national and global, is the market isolated or networked?, or how demand and supply characteristics are correlated to global markets or national markets
17. **Free and fair trade:** degree of transparency, reliability, neutrality and accountability and ethics of the market – how much the market is immune to manipulation of information, to adulteration, to cartelisation, to insider trading and other malpractices.
18. **Economic efficiency of the market:** does it promote optimum value recovery for the produce, reduce negative externalities through its transactions, and use economic resources inversely commensurate to value it generates?

The list can be endlessly extrapolated, including taxation, aspects of political economy, etc.

Applying this toolkit to each level of the so-called value chain, starting from the farm gate to commodity derivatives, we see that there is lot of work to do. Some levels have no transparent market information, most levels have no dispute settlement, lot of the trade is unregulated, and there is lot of risk and intermediation. The produce standards are generic or governmental. Grading and sorting as a service is still to reach the farmer; the farmer is still hesitant in turning from a producer of primary good to getting it processed and then selling it.



The markets are highly intermediated; brokerage is not the only economic cost. The brokers or arhatias are also quality assayers, dispute settlers, credit and risk managers, transaction advisors and often transaction mechanisms themselves. So, to have a level-playing field with free and fair trade having quality-based price discovery, there is scope for improvements in the existing scheme of things. Using this tool kit, one can assess the institutional gaps at each layer.

### Innovation: Under the Hood

What is Innovation by the way? Is it 'solutions looking for problems' scenario? Is it rearrangement of a few parts? Is it the much celebrated 'jugaad'? Or is it what is called bricolage, assemblage of whatever is at hand, just to do something new? It doesn't seem to be so simple an answer; at least to have a lasting and huge impact.

Or is it dismantling and re-working at the components? Is it a systems thinking approach to the problem world? Is it deep insight? Or is it a naked hunch clothed later in theory and armed with modern tools?

The answer really depends on who the

innovator is and what the system is. There are as many approaches as are problems. What is certain is that India has a long way to go to reach the smoother levels that the West has reached. We are not talking about incremental innovations, but paradigm shifts, i.e., the huge systemic change that is possible.

For example, cotton spot trade has disappeared in Australia—entire fields are forward sold, often pre-sowing. The collective selling method works on a reference rate of the International Cotton Exchange ICE Index, and US dollar/Aus dollar exchange rate basis. The basis is best discussed in USD as US cents per pound (US cents/lb). Basis is the difference in price between the value of a physical bale and the underwriting futures contract price. The basis value for a physical bale is a function of quality, location, availability, demand and competition (other growths and subsidies). ICE is the International Index of spot prices.

$$\text{AUD/Bale} = \frac{(\text{Cotton Futures} + \text{Basis}) \times 5}{\text{AUD/USD Rate}}$$

The entire country has accepted this formula, and replaced spot markets with forward sale. Pre-sowing sale is possible, because of standardisation in seed selection, and production methods.





### BPR 2.0: Business Process ReThinking

What business processes can be better seems to be the logical question to ask while undertaking to lay the roadmap for the future. The large "free market" scenario teeters on being an "unorganised" market – with often no market information. For example, cotton bale trade in India is a case in point. The global product that is Cotton Bale is traded in a highly unorganised way: highly intermediated through brokers, with very high market information asymmetry – with the seller and product information being in the hands of brokers only, the product information itself being a source of business – akin to the erstwhile real estate market. Product differentiation is minimal if any.

**Integration with Commodity Markets:** Maharashtra being the home of more than 2000 FPO/FPCs, the state is leading in the Prime Minister's vision of developing 10,000 FPCs. Giving a boost to their profits and risk management tools, Maharashtra is already having an MoU with MCX for Cotton Futures integration of FPOs and other farmers into the exchange. Dedicated MCX accredited warehouses are linked, and farmers have been trained for the same. This, when seen with SEBI-led concessions to FPOs in

commodity market trades, is a welcome innovation in this sector.

### Markets as Network: A Complexity Science View

We are drenched with the word network—social network, networking, etc. The field of network science is a highly formal and mathematical theoretical framework which analyses all networks to unravel, understand,

*Big Data, IoT, GIS, Fin Tech, AI and ML, Blockchain-these major technological paradigms, which I anagrammed into a speakable acronym "BIGFAB 6", represent a virtual arsenal of tools to change civilisation as we know it. And that is not an overstatement.*

replicate and control (and innovate in and through) them. We can see each agro market, and especially each unorganised market as a network of networks. Each seller and buyer being a node, the brokers being connectors – they build rich graph structures. In fact, to borrow the terminology from field of complexity science; each unorganised market is somewhat a "self-organised" system. Cotton, for example, is sold as it seems through social networks.

How can this be better? (the favourite question of innovators). Technology may have some answers worth exploring.

### BIGFAB 6: Big Data, IoT, GIS, Fin Tech, AI and ML, Blockchain

These major technological paradigms, which I anagrammed into a speakable acronym "BIGFAB 6", represent a virtual arsenal of tools to change civilisation as we know it. And that is not an overstatement. Each of these would in the coming years tear apart and rebuild many systems we have taken for granted. But how would BIGFAB 6 impact agro markets? What is in store? Let us look at some possibilities.

Where is price discovery today? WhatsApp. What is the source of knowledge? YouTube. Who is the dermatologist of choice (read plant entomologist)? Google Images. These simple front ends are the tips of huge icebergs, built on sophisticated Machine Learning and AI algorithms, along with Cloud Computing, NoSQL and NewSQL Databases, Graph Databases, API Call-based agile development and deployment, rapid modular toolkit based developments, etc. Seamless integration across front end applications are created by these very technologies.

But by leveraging each technology for its USP, the sector of agro marketing can phase transform from the 20th





Century trade practices into the 21st Century of efficient market economy.

### Case Study of Cotton: SMART Cotton

Cotton itself is a vast subject and field. The Government of Maharashtra and the World Bank together are in the process of launching a Rs 2000-crore, seven-year programme—the SMART State of Maharashtra Agriculture and Rural Transformation Project. In this multi-sector project, the flagship sectoral project is that of SMART Cotton, developed by the writer and his organisation (the Maharashtra Cotton Federation).

In this SMART Cotton project we have aimed to anchor some of the growth and learning strategies precisely on these technologies. We aim at providing field level AI-based knowledge support to farmers, introduce traceability, and encourage quality-based market growth in cotton, including process standardisation and product standardisation and market access by using various technologies.

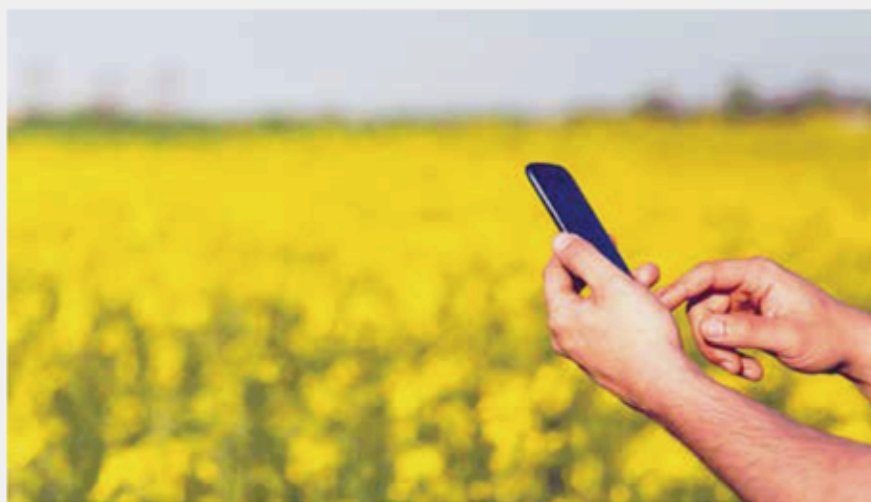
### Use Case Rogue's Gallery:

**GIS:** All agricultural growth is geographical. GIS can overlay soil condition, weather data, micro weather, seed choice, pest attack, water levels, labour shortage, fertiliser use, credit availability, insurance cover, land holding size, nearest market distance logistics, warehousing logistics, market information, and pricing—all together. But imagine if you are able to project the quality of the bale from the farm seed cotton. Imagine if you are able to predict the quality of the yarn from the bale. Is it possible? Yes it is. But the answer is complex—involving many actors and layers of processing, and variations at each stage of handling aggregation and maintenance of quality controls.

**Big Data:** That is where Big Data, along with GIS and as standalone can work. Big Data is essentially a NoSQL or NewSQL-based system, which leverages cloud computing backend to offer a variety of data analytics, data integration, visualisation—opening up to large scale insight hitherto unheard of. Velocity, volume, variety, value and veracity—the Big Vs of Big Data—are all combinable. Various sources of data can be used to plan better production, marketing services, better prediction of market trends, locally and globally. And also plan for gap identification, in

positive feedbacks to build near faultless identification of grades of produce. So the classer, grader or assayer of the far future could be a machine and not a human. ML models can also match market price to inputs, i.e., what conditions of soil, package of practices, etc lead to a particular price band of the produce. Machine Vision, Visual Analytics, combined with sensors are the future of agri mandis.

**IoT:** Connected devices and objects—products, infrastructure assets, logistics, storage, market information,



services, logistics, understand quality demand and build recommendation systems.

**AI and ML:** AI can not only mimic human judgment but can come up with supra-human understanding of systems, compressing learning across millions of persons and man hours and offer recommendations which would have escaped consciousness. For example, AI systems can be built for grading and sorting, quality assurance ecosystem. High quality visual analytics has been developed for sorting tea leaves.

Deep Learning systems can pick up existing knowledge of domain from human "teachers", and learn from

surrounding information can all be on a network. For example, lots of produce could have RFID or QR coded information, weighment would auto read the bags and update the data base, the storage and movement of the assets could be tracked.

**Blockchain, IoT and Smart Contracts:** Blockchain in itself is a large topic. One of the fascinating use cases is that of Smart Contracts. Fit cases can be built in the logistics and warehousing space.

Commodities are such a field that the physical asset holding, its quantity, quality certification, quality assurance, and its valuation is very critical. So is the due diligence process of quality inspections, assessment against





minimum commodity standards for the price by agreed third party. Also added services are the insurance products based on these assets; credit raised as collateral; settlement in forward or futures based on such holdings. Now with electronic tradeable e-warehouse receipts, the digital documentation of produce is the next step.

This is where Smart Contracts can come into play: imagine a quality assurance ecosystem, seamlessly integrated with IoT based sensors, reading and validating and providing proof of assets being held in warehouses. The IoT sensors would keep track of fumigation, humidity, pest as also about movement, etc. Sensors would trigger events. The quality certificates, inspections and other documentation itself could be on a Blockchain. Such information systems would enable a trust network to be established; the asset could be leased, used as collateral or sold, based on solid trusted certification. When the transaction is settled, Smart Contracts could automatically track the movement and alert the new owner of movements and generate new documentation.

Blockchain is a supreme solution for traceability—farm to fork. It can enable building of better networks and assessing the supply chain.

**IoT-based Quality Assurance:** Quality assurance and IoT have a long journey. Sensors and actuators network can alert the produce owner, aggregator or the intermediary of loss of quality, say humidity, and alert for critical risks like rain or fire, etc.

**FinTech + IoT:** The large suite of technologies under the FinTech umbrella allows seamless integration of individual and corporate identity validation, payment systems, KYC, asset agnostic payment solutions. Also FinTech solutions can build farmer



credit profiles, help agri business go paperless, faceless and cashless. Faster monetisation of produce is possible. A quality assured, certified, and IoT secured stored lot of say cotton bales may immediately be used as collateral to raise short term loans, while the FPO explore the market or use the commodity exchanges to hedge their produce.

**Global Associations:** As we speak, huge conglomerates have leveraged these BIGFAB 6 technologies to build global trading networks in various commodities—VAKT in energy trading, Komgo in trade finance, Forcefield in commodity tracking, especially metals. Such systems are yet to be developed in our country.

### Innovation: Never say Never

With these kinds of tools at hand, it is the need of the day to reach out to the industry, and to the various international organisations to develop partnerships, encourage investment and to develop market led solutions, and to foster growth of free and fair trade with equitable returns to all stakeholders. One of the key projects in cotton sector, SMART Cotton builds on these very foundations for a radical change in approach of quality in the field of cotton. And we are keenly looking forward to taking this

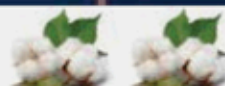
project ahead including such developments.

**Public-Policy Perspective:** The public policy of the 21st Century, in the global, cashless, integrated, free trade, sustainable, equitable, fast and flat world has to be:

- Highly data oriented
- Adaptive
- Flexible in approach and tools, but focused on positive outcomes
- Leverage private and business perspectives of risk
- Keep public interest and equitable growth in mind.

With these challenges, the BIGFAB 6 tools and the market analysis toolkit in hand, better market systems, structures and processes are possible. New policies ought to encourage such systems—exactly what SMART Cotton Project the author is heading, aims to do.

The field of agriculture marketing is on the cusp of a huge leap. This growth has to be carefully nurtured and all support has to be given to accelerate towards it. Innovations in this space are needed both from public policy perspective and from private enterprise. This would help Maharashtra reach the \$1 trillion economy, with agribusiness taking a leading role. 





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## Key Themes

- Urban Development
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- Smart Cities & Swachh Bharat
- Urban Transport
- IT & eGovernance
- Power & Energy
- Water & Sewage Management
- Solid Waste Management
- Green Energy
- Effective Drainage System
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## How AI helps agriculture in India survive critical weather

by Himanshu Goyal



During an unseasonal rain in April 2018, farmers in the districts of Punjab, Haryana, Rajasthan and Uttar Pradesh lost a quarter of their crops on the eve of harvest.<sup>1</sup> To make matters worse, the crops that survived the rainfall suffered from inferior grain quality.

Similarly, farmers who cultivated wheat saw pre-monsoon changes seriously impact their produce. In the states of Jharkhand, Orissa and Chhattisgarh, the rice yield experienced several losses during drought months.

Agriculture and climate have depended on each other for ages. Any change in weather directly impacts farmers and crops across the country. To optimize yields, farmers must make pre-season and in-season decisions based on what type of weather they expect.

Watson AI can provide farmers in India with intelligent solutions that provide personalized, actionable weather insights.

But imagine a scenario in which weather insights derived from artificial intelligence (AI) were integrated into every farming decision.

IBM Watson Decision Platform for Agriculture<sup>2</sup> can help growers and enterprises in India reap the benefits of technology and innovation. This IBM solution combines advanced capabilities of cloud, AI, analytics and Internet of Things (IoT) with accurate weather forecasts and data collected from an abundance of farm equipment, remote sensors and environmental information to help farmers make faster, more informed decisions.

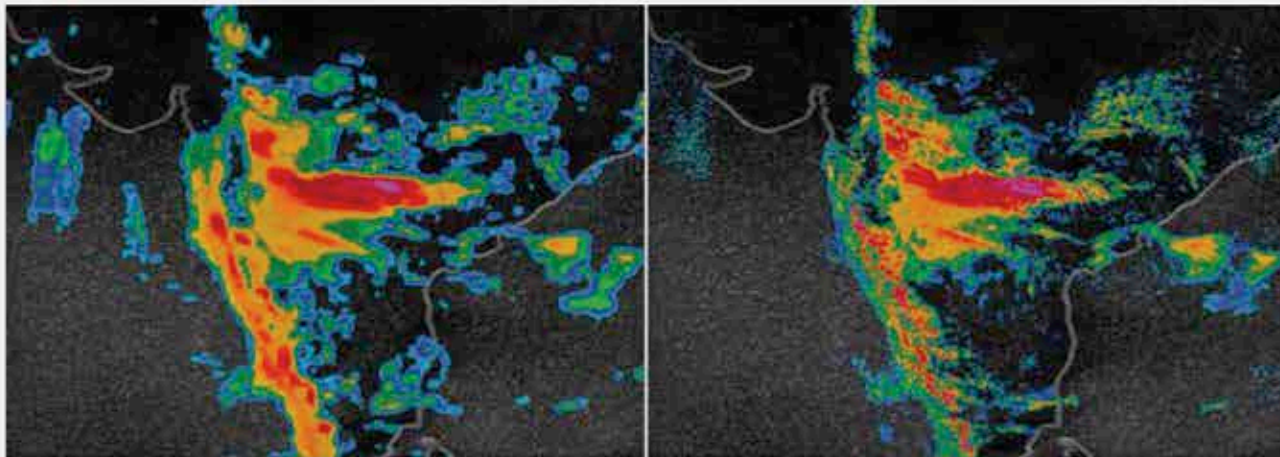
### First comes reliable weather forecasts

If you look at data from the farmers' Kisan Call Centres in India, in the last 2–3 years, over 65 percent of the calls made by farmers were regarding weather forecasts.<sup>3</sup>

IBM's announcement of the new IBM Global High-Resolution Atmospheric Forecasting System (GRAF) is the first hourly-updating commercial weather system that can predict something as small as a thunderstorm, virtually anywhere on the planet. Compared to existing models, GRAF can provide a nearly 200 percent improvement in forecasting resolution for much of the globe (12–3 km; 7.5–1.2 mi.) GRAF is expected to be available later in 2019.







An August 2018 monsoon in India, shown at left by the best current weather model that operates at 13-km resolution. At right, the new IBM GRAF operates at 3-km resolution and updates 6 to 12 times more often. [IBM News Room](#), 8 Jan 2019/PRNewswire



GRAF uses advanced IBM POWER9-based supercomputers, crowdsourced data from millions of sensors worldwide, and in-flight data to create more localized, more accurate views of weather globally.

Today, outside of the United States, Japan and a handful of other countries primarily in Western Europe, the rest of the world must settle for less accurate forecasts for predictions that cover 12- to 15-kilometer (7.5–9.3 mi.) swaths of land — too wide to capture many weather phenomena. And, traditionally, leading weather models update less frequently, only every 6 to 12 hours. In contrast, GRAF will provide 3-kilometer (1.86 mi.) resolution that updates hourly, delivering reliable predictions for the day ahead.

The new system will be the first to draw on untapped data such as sensor readings from aircrafts, overcoming the lack of specialized weather equipment in many parts of the world. It will also give people the opportunity to contribute to helping improve weather forecasts globally because it can use pressure-sensor readings sent from barometers found in smartphones of users who opt-in to share this information. The Weather Company, an IBM Business, will assure it conforms to the relevant operating systems' terms of use. Additionally, hundreds of thousands of weather stations, many that are run by amateur weather enthusiasts, can also contribute data to the model.



## Reliable India monsoon forecast

- Climate models have been consistent in indicating a dry May and June, which also implies a later-than-normal onset to the Southwest monsoon, as well as a quick transition to wetter-than-normal conditions by July.
- This dry-to-wet evolution is at least partially dependent on a potential transition away from El Nino conditions as the season progresses.
- Further, there is a multi-decadal scale dry monsoon signal, potentially driven by the warmer oceans and reduced ocean-land temperature gradient.
- Finally, the model predictions of Indian Ocean sea surface temperatures (SSTs) are indicative of a weakly positive phase of the Indian Ocean Dipole (IOD).
- While it is still too early to make quantitative predictions of May – September rainfall, the evidence suggests, (1) a later-than-normal onset to the season and (2) drier-than-normal season.
- For those who need deterministic forecasts, a forecast for 5 June onset and 95 percent of total monsoon rainfall for the season seem quite reasonable currently.

We are still three months away from the onset of the Southwest monsoon season, but interest in predicting the onset and total amount of monsoon-season rainfall is high and rising rapidly. Last year, in The Weather Company's first attempt at this tricky endeavour, we were a bit too wet, predicting 101 percent of normal precipitation when the observed value was 91 percent (below). We did some things well, in particular, capturing the drier-than-normal mid-monsoon period, and predicting an earlier-than-normal onset. But, after a fast start, the threat of monsoons fizzled-out quickly, possibly because of a developing El Nino.

### TWC/IBM 2018 Indian Southwest Monsoon Forecast

TWC/IBM first Indian monsoon forecast, issued 31 May

	TWC/IBM Forecast	Actual
June	113%	100%
July	97%	93%
August	92%	85%
September	103%	89%
Overall	101%	91%

Correctly captured drier-than-normal mid-monsoon period

But consistently too wet, especially early and late

Forecasts and actuals expressed as % of normal

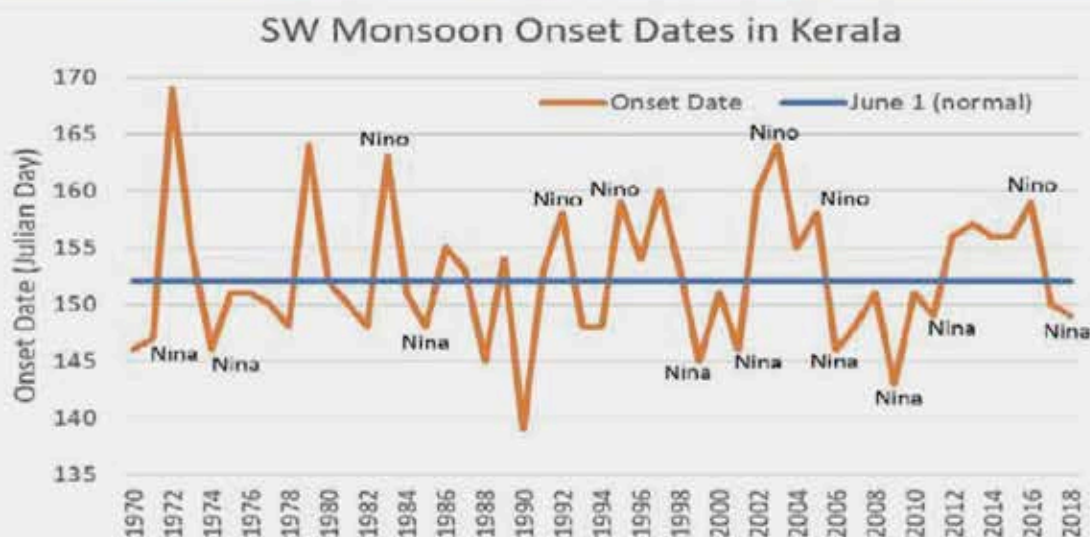
"Asia Seasonal Forecast," Dr. Todd Crawford, Sr. Meteorological Scientist, The Weather Company, 22 Feb 2019







Timing onset is quite difficult, although there are some clear factors you can look at. The graph below shows a historical time series of monsoon onset in Kerala, with the average date of 1 June highlighted in blue. In the last 50 years, date of onset has ranged from 19 May (1990) to 18 June (1972). Much of the interannual variability is described by the state of El Niño-Southern Oscillation (ENSO) from the preceding winter, either El Niño (Nino) or La Niña (Nina). As shown in the graph, most of the early-onset years (for example, 2018) occurred after La Niña winters, and many of the late-onset years (for example, 2016) occurred after El Niño winters (for example, 2016).



"Asia Seasonal Forecast," Dr. Todd Crawford, Sr. Meteorological Scientist, The Weather Company, 22 Feb 2019

## Food security

Modern food companies face daunting challenges as they strive to cope with global environmental change while also meeting the increasing consumer demand for greater sustainability and higher food quality. IBM is helping the agriculture industry improve farming practices with AI-driven solutions that are designed to improve quantity and quality of crop yields through smarter farming practices.

The platform is based on an electronic field record (EFR) that integrates several disparate sources of IoT and farm practice data. The EFR is like an electronic medical record, but for a piece of farmland rather than a human body. This record provides a single source of truth for a farm, applying AI and advanced analytics to field-specific data to create hyperlocal recommendations.



## Scope of AI for farmers in India

The government of India is now taking steps to deploy AI, IoT and data analytics in agriculture. The government's key think tank NITI Aayog is bringing AI to farmers<sup>4</sup> by using IBM's smart technology solutions for the sector. The pilot project "precision agriculture" will provide near real-time advisories to the states of Bihar, Jharkhand, Assam, Maharashtra, Rajasthan, Madhya Pradesh and Uttar Pradesh.

The project aims to develop specific monitoring systems to help improve crop yields and savings. This includes combining weather forecasts with drone and satellite imagery to aid in predicting and detecting pests and diseases so that corrective actions can be taken. This also helps farmers develop better strategies for pesticide use while reducing the environmental impact and lowering overall production costs.

As a result, crop producers are seeing their agricultural activities in a new light. Greater visibility into the likely quality and quantity of a yield improves transparency across the agriculture ecosystem, enabling stakeholders in various roles — including growers, producers, traders and insurers — to respond accordingly. Understanding critical factors such as soil temperature, moisture, pest and disease risk can also allow farmers to make better decisions about planting, irrigation and fertilization.

The solution also uses AI to help farmers identify when to sell their crops by suggesting the best time to maximize profit. With IBM PAIRS Geoscope<sup>5</sup> technology, growers can also apply geospatial-temporal information to help companies make predictions about the future of their farms.

Relying on traditional knowledge and methods may no longer be enough to meet the challenges facing modern agriculture. IBM Food Trust<sup>6</sup> infused with IBM Watson Decision Platform for Agriculture is designed to provide decision-support capabilities to a host of organizations around the world.

In each case, an AI-efficient food chain can support better crop quality and sustainability to help farmers feed us every day.



### Endnotes

- 1 "Unseasonal rain damages crops in north India," The Economic Times, 14 Apr 2018
- 2 "Bringing the power of Watson to farmers," by Ulisses Mello and Sriram Raghavan, Smarter Farms: Watson Decision Platform for Agriculture, 24 Sep 2018
- 3 Open Government Data (OGD) Platform India - data.gov.in
- 4 "Govt aims to harness big data, AI in agriculture sector," Hindustan Times, 13 May 2018
- 5 "IBM PAIRS Geoscope delivers an integrated data platform for geospatial data used for advanced and AI driven analytics," IBM United States Software Announcement 218-556, 13 Nov 2018
- 6 "Bringing new clarity to food supply complexity," IBM Food Trust: trust and transparency in our food

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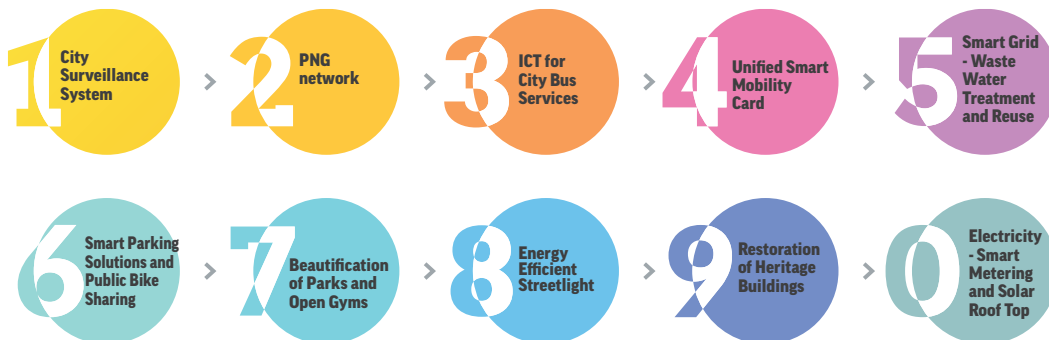
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Chief Minister of  
Uttar Pradesh



**Shri Suresh Kumar Khanna**  
Hon'ble Minister for Urban  
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## KEY FOCUS AREAS



## KEY THEMES

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## **Our Mandate** is to Provide Food Security to **Priority Households**



**Pandurang Pole**

Secretary of Food, Civil Supplies and Consumer Affairs, Government of Jammu and Kashmir

The state of Jammu and Kashmir is one of the unique states in many terms. Technology helps in bridging many challenges – topography, seasonal etc., says **Pandurang Pole**, Secretary of Food, Civil Supplies and Consumer Affairs, Government of Jammu and Kashmir in this interview with **Aarna Bhatia** of **Elets News Network (ENN)**. He also talks about the mandate of the department, which is not only to meet the quantity of food supply but to maintain nutritional quality as well.







### Tell us about the e-services in the Food and Civil Supplies Department of Jammu & Kashmir.

The Department of Food and Civil Supplies have started e-PDS. One of the component of the drive is Supply Chain Management. At the end of the month, closing balance of all Fair Price Shops (FPS) is automatically taken from the Point of Sale (POS) machines. Closing balance of all the FPS, through POS is aggregated at Tehsil and then at District level. For generating allocation of new month, closing balance is adjusted and allocation is made for District, Tehsil and FPS.

So far the Online Grievance Redressal mechanism is concerned, any person having complaint/grievance can lodge online complaint. He receives all updates- such as stage of his grievance and its disposal etc through SMS. He can also give feedback online.

All Ration Cards (RCs) have been digitised and integrated with e-PDS.

### How is technology helping you to fulfill the responsibility of distribution of essential commodities to the people of Jammu & Kashmir?

The state of Jammu and Kashmir is one of the unique states in many terms. There are three regions, Jammu, Kashmir and Ladakh. People from these three regions speak different local languages and have different food habit. It is one of the most diversified states.

Technology helps in bridging many challenges – topography, seasonal etc. It enables officers of the Department to monitor closely. Daily Dash Board presents statistic in understandable manner. It helps in plugging loopholes in the system by Aadhaar seeding in ration cards and issuance of ration after Aadhaar authentication.

Tell us about your schemes like Mufti Mohammad Sayeed Food Entitlement Scheme and National Food Security Act, 2013.

The state of Jammu and Kashmir is one of the last states to join National Food Security Scheme (NFSS). The reason was that the state was apprehending lesser coverage in the NFSS that earlier targeted PDS. It is not a food surplus



state like Punjab, Haryana etc. The state joined the scheme in 2016.

Around 75 percent population in rural area and 50 percent population in urban area are covered under National Food Security Act. Per person entitlement is five kg ration per month. Owing to food deficient state status, it was not sufficient. Additionally, five kg ration from the State Government scheme – Mufti Mohammad Sayeed Food Entitlement Scheme is provided.

### You are also committed to protect and guard the interest of the consumers in the state. What are the latest steps taken in this regard?

The mandate of the department is to provide food security to priority households. The targeted population is poor or lower middle class, mostly rural. Still the basic need of this segment is food, not only quantity but nutritional quality.

Apart from use of technology, empowerment of local self government institutions- Gram Panchayat has been done. Three member Village vigilance committees under concerned Sarpanch have been constituted in every village. Mandate of the committee is to monthly review- food grain received, disbursed and balance. The committee can recommend deletion or addition of a family in subsidised ration scheme. To monitor performance of these committees, the District Collectors have been designated as District Grievance Redressal Officer (DGRO).







# 'Gujarat Leveraging Tech for Better Price Discovery of Agriculture Produce'

The portal, e-National Agriculture Market (e-NAM), is facilitating the farmers to get better price discovery for their agriculture produce. As many as 79 APMCs across the state are integrated with e-NAM, with computer hardware, net connectivity and manpower, says **B M Joshi**, Managing Director of Gujarat State Agriculture Marketing Board, in an interview with **Elets News Network (ENN)**.



**B M Joshi**

Managing Director of Gujarat State Agriculture Marketing Board







**Please share an overview of the agricultural scenario of Gujarat.**

In Gujarat, there are 224 APMCs, which facilitate the farmers to sell their agriculture produce and get better price for their crops. Cotton and groundnut are main crops of the Saurashtra region, whereas wheat, paddy, maize, tur, juwar and tobacco cover the north and middle part of the state. Sugarcane is main crop so far as South Gujarat is concerned. There are 14 sugar factories being run on co-operative basis. Fruits and vegetables are being produced in the state, but have been de-notified from the purview of the APMC Act.

**Gujarat is one of the highest producers of cotton in India. How is your department leveraging this in terms of marketing and economic growth of the state, vis-à-vis the country?**

*“Farmers need to be educated and made aware of the latest technology and innovations in the agriculture sector, so that these can be used for improvement of yield.”*

The APMCs of Gujarat are affiliated with the Gujarat State Agriculture Marketing Board, which facilitates the APMCs to implement state/Central government schemes and to prepare and execute various projects. Cotton is a major commodity, which is traded

through APMCs and the farmers can have better price for their produce, i.e., cotton. The Gujarat State Cotton Federation is an apex society in Gujarat.


**What kind of technological innovations have been brought forth in the agriculture sector of the state?**

e-National Agriculture Market (e-NAM) is a portal which facilitates the farmers to get better price discovery for their agriculture produce. As many as 79 APMCs across the state are integrated with e-NAM, with computer hardware, net connectivity and manpower. Assaying laboratories are being installed to get quality parameters of the produce. Weighbridges and weighing scales are also being integrated with the portal.

**What are the major challenges of the sector and what are the ways adopted to mitigate those?**

Farmers need to be educated and made aware of the latest technology and innovations in the agriculture sector, so that these can be used for improvement of yield, productivity and the quality of the agriculture produce.

**What are some of the recent schemes launched by the Board? How are those benefitting the stakeholders?**

- i) Kisan Kalpavruksha Yojana  
APMCs can have upto 50% assistance from State Government for their infrastructure project.
- ii) e-NAM  
It is an electronic agriculture market platform, where farmers can have better price discovery for their agriculture produce.
- iii) Subsidy  
Transport subsidy of Rs.50 (per 50 kg bag) for potato growers and onion subsidy for onion producers. 





**Nand Kishor**

Director Horticulture-Cum-Mission  
Director, Government of Bihar

My main approach as the Mission Director of horticultural development in Bihar revolves around the concept of cluster mode of cultivation. The cluster approach not only helps in better and economical way to get different horticultural inputs but it also provides a better marketing platform and minimum post harvest loss, says **Nand Kishor**, Director Horticulture-Cum-Mission Director, Government of Bihar in this interview with **Elets News Network (ENN)**.

litchi, banana and pineapple. Bihar produces almost 70 to 80 percent litchi of India.

**What are the initiatives taken by you as the Mission Director?**

My main approach as the Mission Director of horticultural development in Bihar revolves around the concept of

## There is a need of Private investment in Agricultural Marketing infrastructure at every level

**What is the agricultural scenario of Bihar.**

Bihar is one of the fastest growing states in India and the key to overall development is agriculture sector. The strong foundation of Bihar's agriculture lies in its fertile indo-gangetic alluvial soil and adequate water resource especially ground water. The diverse and favorable agro-climatic conditions of Bihar help in production of variety of crops, fruits and vegetables. The production of flower in Bihar has been improved significantly in recent past.

**Which are the major agro produces of the state? Please state the rank of the producers in terms of the country.**

The major cereal crops of Bihar are rice, wheat and maize. Bihar is one of the leading producers of these three food grains in the country. Arhar, gram and pea are the major pulses which are grown in Bihar. Bihar is sixth largest producer of fruits, third largest producer of vegetables, sixth largest producer of rice, fourth largest producer of maize and sixth largest producer of wheat in India. The major fruits produced in Bihar are mango,







cluster mode of cultivation. The cluster approach not only helps in better and economical way to get different horticultural inputs but it also provides a better marketing platform and minimum post harvest loss. In this background a new scheme has been prepared by the name of "Bihar Rajya Udyanik Utpad Vikas Yojana". In this scheme, small scale sorting, grading, packaging, storage and processing unit will be provided to the farmers group on the farm who have done the cluster farming in minimum area of 50 ha. Apart from that, for better planting material of fruits and vegetables, initiatives have been taken to provide better inputs and good quality planting material from Centre of Excellence.

### Who are the major stakeholders for the agro marketing sector and how do they contribute in the progress of the sector?

In my view, stakeholders of agricultural marketing sector can be broadly divided into Direct as well as Indirect stakeholders.

### Agricultural Produce Marketing Committee (Bazar Samiti) is now not in existence in Bihar.

Recently Department of Co-operative, Government of Bihar has started the vegetable marketing system in Urban Area through a van called TARKARI which is becoming popular because of its price and quality.



### What are the areas of improvement you would like to implement in the sector?

There is a need of private investment in Agricultural Marketing infrastructure at every level. Weekly Gramin Haats (Village Markets) may be strengthened by providing support to farmers group. Grading, standardisation, packaging facilities at local level will help in better marketing with more income to farmers.

### How is technology leveraged in the agro marketing sector of Bihar?

In Bihar, farmers are beginning to adopt precision agriculture, a sub category of agriculture technology through machines and equipments that use data analytics and robotics to optimise inputs and enhance yields. The application of precision agriculture technology are plenty including data-driven predictive technologies to forecast climatic conditions and sensor based micro-irrigation. Precision farm technology can also apply to post harvest activities such as assessing the quality of produce, grading it and supply chain management. In Bihar, Solar

Micro Cool Chamber and Reefer Vans is getting popularity among the farmers. Solar Micro Cool Chamber is portable, solar powered cold room with storage capacity of 5MT that works with an efficient thermal energy storage to provide backup of over 30 hours. It is used for on-farm cooling and storage of produce right after post harvest. It is ideal for storing fruits, vegetables, flowers and other perishable commodities. Solar Micro Cool Chamber have been provided to farmers on 50 percent subsidy of Unit Price Rs 13 lakh (i.e., subsidy of Rs 6.5 lakh per Solar Micro Cool Chamber).

Reefer Vans/Refrigerated Transport Vehicles come with the latest technology of GPS and data loggers, enabling 24/7 online vehicles and temperature tracking. Easy unloading of products from roll containers through side service doors. Product is protected in excellent way since there is no exhaust and hence it is non polluting. Refrigerated Transport Vehicles/Reefer Vans have been provided to farmers on 50 percent subsidy of Unit Price Rs 26 lakh (i.e., subsidy of Rs 13 lakh per Refer Vans).

Solar Micro Cool Chamber and Refrigerated Transport Vehicles/Reefer Vans not only reduces post harvest losses but also provides opportunity to farmers for better marketing.

### What is the export scenario of the agricultural produce of Bihar?

Export of Agricultural produce of Bihar from Bihar is negligible but agricultural produce like honey, makhana (fox-nut), some vegetables and fruits, etc. of Bihar are exported from other parts of the country. Some food grains, litchi, honey and makhana have high export otential. Bihar is looking forward to exports high quality fruits like litchi, mango and banana. We are planning to export its vegetables like pointed gourd, okra, bitter gourd, etc. to Arabian Countries.

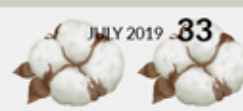
## Stakeholders of Agri-marketing

### DIRECT STAKEHOLDER

- Farmers
- Farmers group like FPOs, FIG
- Middle man
- Aggregators
- Whole seller
- Consumer
- Government

### INDIRECT STAKEHOLDER

- Financial Institutions
- Transporters
- Marketing Infrastructure Developers
- Storage House
- Physical Infrastructure Developers like Road, Electricity, etc





# ROOT IDENTIFICATION

and Systematic Monitoring System May Lead to Success in Marketing



**Nirmal Adhikari**

Additional Secretary, Registrar of Cooperative Societies, Government of Tripura & Managing Director, Tripura Tea Development Corporation Ltd.

We have to search for root of the any subject/problem and this root identification with systematic monitoring will lead to a success in marketing which is the result of good relation among all, writes **Nirmal Adhikari**, Additional Secretary, Registrar of Cooperative Societies, Government of Tripura & Managing Director, Tripura Tea Development Corporation Ltd.







Tripura is a small state in India. The co-operative movement in this state has started from 1949 and the result of effort is 11 apex level co-operative Societies, 212 Primary Agricultural Credit Societies (PACS), 56 Lamps, 14 Primary Marketing cooperative Societies are in operation. Apart from these, there are other types of co-operative societies existing in Tripura like Tea Plantation, Fishery, Diary, Industry, Consumers and other multi-purpose societies.

All these co-operative societies are executed with the vision of 'Strengthening, Modernising and Developing co-operative Sector as whole in order to become a pivotal stake-holder of Model State, Tripura by way of rendering service for Inclusive Growth, Good Governance and Mass Participation for Rural Prosperity & Urban advancement'.

The marketing strategy of Co-operation Department, Government of Tripura may be described in the following manner:

### Marketing Strategy

Since there are different types of co-operative societies functioning in the state, their nature and scope of operation is also different. Hence, various forms of marketing strategies have been adopted for their functioning and growth. The synopsis of which is as follows:

**TSCB Bank:** The bank has 62 branches and four extension counters with a deposit of Rs 2862.94 crore, out of which, advance of Rs 1681.14 crore as on March 31, 2019. The net worth of the Bank is Rs 16,529.42 crore maintaining 20.47 percent CRAR with a profit of Rs 15.59 crore during 2018-19. The bank is running to expand credit activities in rural areas across the state through KCC (Kisan Credit Card)



loan in the shape of Joint Liability Groups (JLGs).

Secondly, the bank is also looking forward to provide "Micro ATMs" through Large Area Multipurpose Cooperative Societies (LAMPS)/PACS. Besides RuPay ATM Debit Card / RuPay KCC card have also been introduced by the Bank.

Thirdly, E-Stamping has already been

introduced in the state of Tripura by Tripura State Cooperative Bank (TSCB) in 21 branches.

Fourthly, initiative has also been taken by the Bank for AADHAAR card authentication, modification, Initiation etc. along with PAN card processing services.

Fifthly, programmes are being implemented successfully for the welfare of common public and through these marketing strategies, access to common people has been made possible.

**Tripura MARKFED Ltd:** It is an Apex Level Society working with PMCS, LAMPS and PACS whole over the state. It is mainly engaged in LPG distribution business having consumer base of 14,500 consumers. Besides, it is also doing fertilizer business as an agent of IFFCO in the whole state of Tripura.

Secondly, the society is engaged in procurement of Minor Forest Produce Scheme with the Financial Support from Ministry of Tribal Affairs, Government of India for strengthening of financial conditions of Tribal people.

Thirdly, it is also engaged in distribution of Generic Medicines through its 10

*Since there are different types of co-operative societies functioning in the state, their nature and scope of operation is also different. Hence, various forms of marketing strategies have been adopted for their functioning and growth.*



outlets with financial help of State Government to ensure the supply of quality medicines at affordable price to patients.

**LAMPS/PACS/PMCS:** Tripura is an agrarian state. A proposal has been sent to the State Government for procurement of Paddy directly from farmers through LAMPS/PACS & PMCS. As a result, farmers can directly sell their produce without involving any middlemen at a fair price and Co-operative societies will get commission for their development.

Secondly, it is also engaged in credit business (KCC & JLG) as per recommendation of Vaidyanathan Committee and as a result rural people get financial support for doing their agriculture and other business activities bearing very low margin of interest.

Thirdly, through deposit mobilisation among members, banking facility has been extended at the door step of people living in the remotest corner of society by the LAMPS and PACS.

**Dairy Sector:** Tripura Co-operative Milk Producers Union Ltd. (Gomati) collects fresh cow milk directly from the milk producers through Primary level societies. It is followed by milk processing (Pasteurising), packaging and

*Tripura is an agrarian state. A proposal has been sent to the State Government for procurement of Paddy directly from farmers through LAMPS/PACS & PMCS. As a result, farmers can directly sell their produce without involving any middlemen at a fair price and Co-operative societies will get commission for their development.*

marketing at a fair price, maintaining requisite standard quality which is safe for consumption of children and patients.

Besides, the Co-operative society is also engaged in marketing of various

other milk products like cottage cheese (paneer), yogurt, ice cream, clarified butter (ghee) etc.

As an innovative attempt, the Gomati milk society is utilising social media through internet facility and road show by tableau for generating awareness among the common people and also for increasing marketing business.

**Fishery Sector:** Tripura Apex Fishery Co-operative Society is also working in tune with all the primary level fishery Co-operative societies, especially focusing in production of fish, fingerling, fish-feed etc. to meet up the local demand and ensure supply in hospitals for patients at a very reasonable price.

**Tea Co-operatives:** Tripura is a hilly state and agro-climatic condition is most congenial for producing of quality tea. Societies engaged in tea business do everything starting from plucking of tea leaves to marketing of processed tea not only in Tripura but also outside the state. Special emphasis has been given in the production of 'green tea' which has a huge demand throughout the country. Government is also enthusiastic in extending help and support through Tripura Tea Development Corporation.

**Handloom & Handcrafts And Other Co-Operative Societies:** The small artisans are making various exquisite varieties of handloom and handcraft products using bamboo, cane, wood etc. in order to sell through selling counters of Government of Tripura named 'Purbasha'. It has a great demand in all over the country. Participation in rural huts, exhibition cum expo in major states, marketing through social media, emphasis on digital payment avenues have been explored.

For marketing strategy in co-operative sector as well as Tripura Tea Development Corporation (TTDC) Ltd.,







a unique system is being followed. The root of problems has been identified in this Corporation and constant monitoring is the key factor for its recent development. Recently, the quality of 'Made Tea' has improved due to proper plucking, processing and maintaining cleanliness in the factory. Last year, loss amount has been checked nearly Rs 1 crore and for the year 2019-20, TTDC Ltd. has fixed a target for profit making way. Recently sample survey of auction market has given their consent for valuation of CTC with the brand name 'Tripureshwary Tea' from Rs 128 per kg to Rs 165-170 per kg. This is a big achievement for TTDC Ltd.

Coming back to the buyer-seller relations between TTDC Ltd. and producers, they have given helping hands to the producers, especially small growers. They are getting good price, TTDC Ltd. is also maintaining good relations with common friend "The Broker". Thus ensuring quality green tea leaves not from the big gardens only, also from small growers in Tripura, TTDC Ltd. is creating a new era.

Apart from the above functioning of Department of Co-operation, the role of the Tripura Tea Development Corporation and its strategy is articulated below:

- To plant, grow, cultivate, produce and raise plantation of tea and all kinds of forest plants, trees crops and to buy, sell, re-sell, export, import, manufacture, process of tea and above related produces.
- To purchase and take over the tea estate in Tripura from time to time and develop the same to carry on business in plantation, manufacture and sale of tea in local and auction market.
- To take on lease and manage tea estate being fully satisfied about their economic viability for safeguarding the future of the



industry, protecting the interests of workers and increase employment potential.


- To rehabilitate, revive, modernise, manage, run, advice and assist in any other way of closed and uneconomic tea gardens.
- To increase productivity of tea labourer.
- To supply tea plants, cutting to the different R.D. Blocks and provide technical support to the small growers for raising tea nursery and tea plantation for more than 15 years. At present, services of three employees of corporation have placed in different R.D. Blocks for providing technical services to the small tea growers to improve their economical conditions.

The marketing strategy of this corporation for selling of packet and loose tea of this corporation in local markets as below:

For the last few years, the quality of made tea has been improved constantly by this corporation after giving due importance in choosing quality green tea leaves and maintain processing steps in factory. As a result, the demand of made tea produced by this

corporation is going up day by day, to cater this ever going demand of made tea the following steps have been followed:

- The TTDC Ltd. has its own four sales outlets through which packet and loose tea brand as 'Tripureshwari Tea' has been sold to customers in retail and whole sale quantity.
- Besides, for selling bulk quantity of tea, whole sale fixable competitive rate has been fixed after considering the all factors as influenced by the market.
- Recently with other government department, corporation and co-operative bodies etc. agreement/MoU are going to be signed for selling of packet tea through their respective outlets on commission basis for beneficial of both.

At last my important innovative conception is that, we have to search for root of the any subject/problem and this root identification with systematic monitoring will lead to a success in marketing which is the result of good relation among all. This is the theory of "Sabka Sath, Sabka Vikas, Sabka Viswas", which we are following. 





## APSCS&T Offers Innovative Solutions for Agriculture Sector Problems



**C D Mungyak**

Director, Department of Science and Technology  
Arunachal Pradesh

The Arunachal Pradesh State Council for Science & Technology has been able to apply science and technology towards improving quality of life of people in the state. It has been successful in implementing various scientific and technology projects in the state, says **C D Mungyak**, Director, Department of Science and Technology, Arunachal Pradesh in this interview with **Elets News Network (ENN)**. He also talks about the role of science and technology in technological innovations for the agriculture and horticulture sector.



### Give us an overview of the Department of Science & Technology, Government of Arunachal Pradesh.

The Government of Arunachal Pradesh created the Department of Science & Technology in the year 1998 to cater to the needs of science and technological requirement of the state. The Department also advises the government on policies and measures necessary to promote utilisation of science and technology towards achieving techno-economic development in the state.

At present, the department is functioning through the Arunachal Pradesh State Council for Science & Technology (APSCS&T) and the State Remote Sensing Application Centre (SRSAC).

The State Council for Science & Technology was created in the year 1992 under the state's Education Department. In the year 1998, after creation of the Department of Science & Technology, the Council was brought under the fold of the Department of Science & Technology. The State Council for Science & Technology has been functioning with the prime objectives of playing a catalytic role in application of science and technology for societal development, popularisation and communication of science and technology for proper utilisation of natural resources, development of human skills in rural areas, documentation of IKS and its development through technological intervention and inculcating scientific temperament among the people of the state.

The State Council for Science & Technology is putting maximum efforts to accelerate the pace of formulation and implementation of projects and programmes through utilising the available expertise and implementing projects in different areas in association with Government Departments, Research Institution, Educational Institutions and Non-Governmental Organisations.

The Council is headed by the Director cum Member Secretary, who is also the Ex-Officio Director to the Government, Department of Science & Technology. The Council has specialised and dedicated team of young scientists. The council acts as the nodal agency for Department of Science and Technology, Department of Biotechnology, Government of India in the State for implementation of its projects and programmes.

### Tell us about the different centres for the Department of Science and Technology.

The State Remote Sensing Application



Centre (SRSAC) was established in the year 1996 under the aegis of State Council for Science & Technology. Since the inception, the centre has been serving the state as an apex body for various activities related to Remote Sensing and GIS (Geographical Information System) applications in the state. The main objective of SRSAC is to utilise the advanced state-of-art Remote Sensing and GIS technologies for inventory, mapping and monitoring of natural resources and planning for their sustainable development and also for effective rural and urban developmental planning in the state and taking up research/projects addressing various environmental problems and hazards in the state.

Taking a step forward for popularising science and technology in the state, the Council has set up Arunachal Pradesh Science Centre at Itanagar during 2005-06 sponsored by National Council of Science Museums, Department of Culture, Govt. of India, Kolkata. The centre has the state-of-the art cutting edge technologies as live exhibits enabling the students and general public to understand about the technologies and their applications. The science centre is providing an experiment based learning ambience to inculcate a spirit of inquiry, foster creative talent and scientific temper in the community as a whole.

It is characterised by its two pronged

channel of communication-exhibits and activities. While the exhibits, both indoor and outdoor, are most interactive, the demonstrations and training programmes are also fully participatory and has been helping children and the adults alike to learn the basics of science through fun and enjoyment.

APSCS&T has also set up an Innovation Hub at Science Centre, IG, Park, Itanagar. The project was funded by National Council of Science Museum, Ministry of Culture, Government of India. The various facilities set up under the Innovation Hub are Discovery Hall, Resource Centre/Hall of Fame, Idea Lab, Design Studio, Robotics/Electronics Lab, Tod FodJod (Break and Remake), Kabad se Jugad (Make useful product from waste

material) and Idea Box. The Innovation Hub facilities shall facilitate as a platform for all section of society including grassroot innovators to engage in innovative and creative activities. The hub will promote creative thinking and problem solving abilities through hands on activities and experiments.

Biotechnology has been added as one of the new division in APSCS&T in the year 2017 to cater the need of biotechnological interventions in conservation and sustainable utilisation of these bioresources towards improving the socio- economic status of people in the state.

Department of Biotechnology (DBT), Government of India in March, 2018 has sanctioned the project submitted by APSCS&T for "Establishment of Centre for Bioresources and Sustainable Development in Arunachal Pradesh as a Centre of Excellence". This DBT-APSCS&T Centre being established at Kiminis aimed at developing the bioresources, emphasising sustainable utilisation, conservation of the resources, safeguarding of IPR issues of the indigenous communities and improvement of the socio-economic status of the people through scientific intervention using biotechnological techniques. The centre will facilitate for carrying out research and developmental activities in the field of biotechnology and catalyse the activities for sustainable development of the bioresources of the state as well as encourage entrepreneurship development.

### What are the major achievements of your department in recent years?

APSCS&T has been able to apply science and technology towards improving quality of life of people in the state. It has been successful in implementing various scientific and technology projects in the state. Over the recent years the major



achievements of the department are the following;

- Establishment of "Centre of Excellence for Bioresources and Sustainable Development at Kimin, Arunachal Pradesh" for sustainable utilisation of bioresources and its conservation. The project is being funded by Department of Biotechnology, Govt. of India.
- Implementation of DST, Govt. of India funded project "Establishment of Rural Technology Demonstration Centre" at Kimin, Arunachal Pradesh.
- Setting up of Patent Information Centre in the council to work towards protection and safeguard of the Intellectual Property Rights related issues and indigenous knowledge and scientific innovations.
- Replication and adoption of suitable technologies viz. Watermill, micro hydel for harnessing and utilisation of the renewable energy sources for development in rural areas through science and technological intervention.
- Setting up of Innovation Hub cum Space Education Centre at Science Centre, I.G.Park, Itanagar in 2018.
- Successful conduct of various science popularisation program like State Children Science Congress, Nature Camps, Teachers training programmes and workshops, National Science Day and National Mathematics Day to name a few.

- Strengthening and skill development of scientific and technical staffs of the council.
- APSCS&T is a Partner Organisation in the Gandhi Global Solar Yatra 2019. This is a global event initiated IIT Bombay under its SoULS initiative.

### How is the department ensuring promotion of application of science & technology for proper utilisation of natural resources, mapping, documentation and development of Indigenous Knowledge System (IKS), replication of technologies and popularisation and communication of science & technology?

APSCS&T plays a major role towards sustainable utilisation of the bio-resources and its conservation. The council has developed and worked in many projects that have goals and objectives of proper utilisation of natural resources which includes identification of medicinal plants and understanding its properties, documentation and value addition of important wild edible plants of the state.

One of the major projects funded by the Department of Biotechnology, Government of India works towards development of 'Centre of Excellence for Bioresources and Sustainable Development' in Kimin, Arunachal Pradesh. The objective of the centre is to



work towards sustainable utilisation of bioresources of the state and its conservation through the intervention of biotechnology.

The Council also has IPR cell which works towards mapping, documentation and protection of Indigenous and Traditional Knowledge. Various technologies have been successfully replicated and implemented in various parts of the districts of the state and many projects on replication of technologies like watermill, geothermal, and micro hydel have been successfully implemented by the council. The objectives of the projects are towards improving quality of life of people in the state.

One of the major projects funded by Department of Science and Technology, Government of India has been 'Establishment of Rural Technology Demonstration Centre' to work towards replicating, demonstrating various

populations and students of the state. The council has been working since 1995 towards popularisation and communication of the science amongst the masses in a large way.

Various training programmes, workshops have been conducted for increasing the awareness amongst the students and local population. The council is responsible for implementation, organising of the National Children's Science Congress (NCSC), the flagship programme of Department of Science & Technology, Government of India in the state.

In this direction, the State level Children Science Congress programme is being organised annually since the last 24 years. The congress provides platform to both school and non school going children to showcase their innovations. The top 10 students are provided opportunity to participate in national level.

conclave, we expect to see a congregation of large number of eminent scientist and technologist from various Educational and Research Institutions as well as from Industries.

### **What's your opinion on the importance of technological innovations for the agriculture and horticulture sector?**

Science and technology provides scientific innovative solutions to the problems in the agriculture and horticulture sectors. From improving agricultural tools to providing bio-fertilizer, to finding solution for the diseases and developing post harvest technologies science and technology provides innovative solutions for increasing the productivity of the horticulture and agricultural crops. The science and technology have various applications and plays a major role in increasing the productivity of the agriculture and horticulture. The agriculture and horticulture are both research oriented and hence science and technology, biotechnology has a very important role in the given sectors.

The few applications amongst the others are the following

1. Providing improved agriculture tools in accordance to the need of the farmers and terrain.
2. Protection of crops against diseases and pests.
3. Designing the best methods of crop storage.
4. Helping in predicting the climate conducive for agriculture practice.
5. Improving yield variety through resistant variety crops.
6. Post harvest technologies in protecting the crop and the yield.
7. Providing value addition to the crops and fruits for improving the economic sustainability of the farmers.
8. Climate Resilient Agriculture is new techniques using artificial intelligence to yield climate adaptable seeds and productivity. 



important agro-techniques like Mushroom cultivation, Medicinal and aromatic plants cultivation, production of bio fertilizers and vermi composts, oil distillation unit, value additions to fruits amongst other techniques by providing training to local populace for their skill development and sustainable improvement of their economic condition.

Science popularisation and communication is one of the major objectives of the council to disseminate the knowledge of the science to the local

Other programmes include Sci-connect by Vigyan Prasar, Department of Science and Technology, Government of India which works towards arising interest of students towards science. Arunachal Pradesh Science Centre, I.G Park, Itanagar is a premier institute committed towards popularisation and communication of science amongst the students and the general populace of the state.

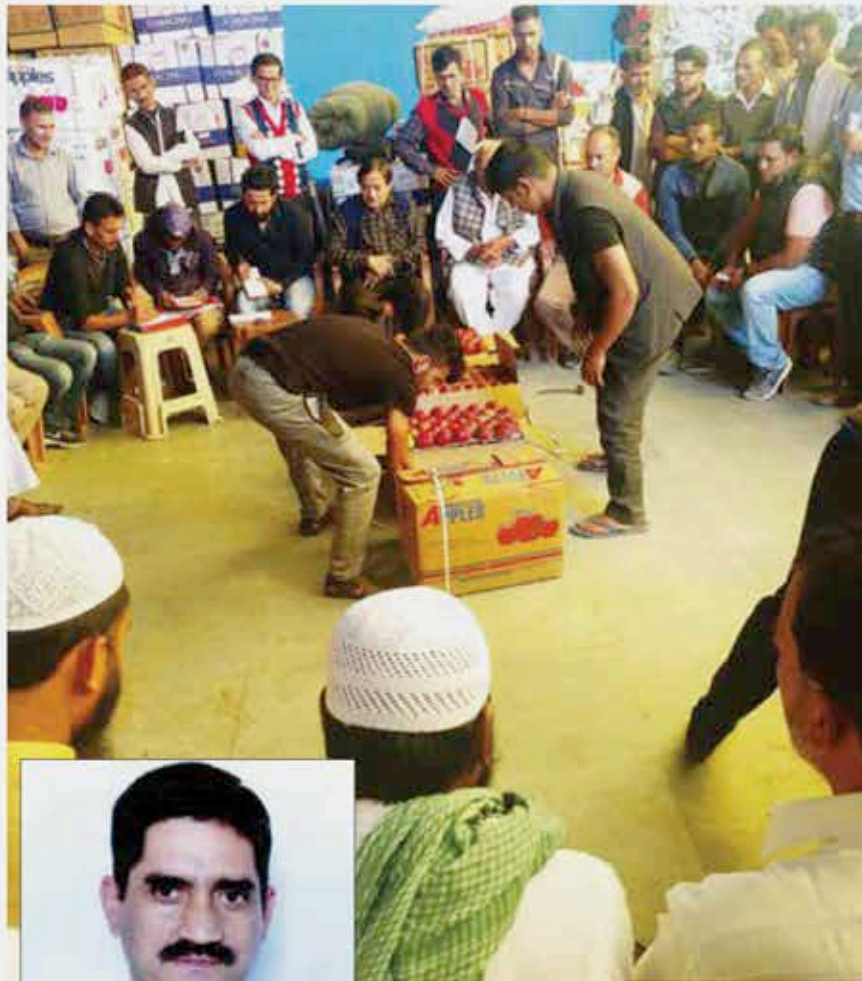
We are also planning to hold an S & T Conclave of Himalayan States during October-November 2019. During this





# HIMACHAL PRADESH

## Progressing Towards Technology-Enabled Agro Produce and Procurement



**Virender Singh**  
Senior Marketing Officer, Himachal Pradesh State Marketing Board

The total geographical area of Himachal Pradesh State is 55,673 Sq Km and shares its boundary with China and four Indian states viz. Jammu & Kashmir on the north, Punjab towards South West, Haryana on Southern side, Uttarakhand on the South East. The state has 12 districts, 78 blocks, 20,690 villages and 3243 Gram Panchayats.

The net sown area in the state is 5.43 lakh hectares with cropping intensity at 173 percent. There are 9.61 lakh land holding of which around 88 percent are small and Marginal farmer (upto two Hectare). About 80 percent of the total cultivated area in the state is rain-fed. Rice, wheat and maize are important cereal crops and Urad, Bean, Rajma and Gram are the important pulse crops of the state. Apart from food grains, the state grows a variety of horticulture crops such as Apple, Stone fruits (Plum, Peach, Apricot, Nectraïne), Citrus etc. Apart from this, variety of offseason and exotic vegetables are also grown in the state. Himachal Pradesh is also well known as the 'Horticulture State of India'.

Himachal Pradesh is also known as the 'Horticulture State of India'. Himachal Pradesh State Agricultural Marketing Board and department of agriculture regulate marketing of agricultural produce of the state, writes **Virender Singh**, Senior Marketing Officer, Himachal Pradesh State Marketing Board.







Five perennial big rivers Satluj, Beas, Ravi, Chenab and Yamuna flow through its territory. The utility of these rivers though restricted considerably because of undulating terrain of the state, nevertheless, these rivers possess immense potential for the generation of hydro-electricity.

Apple is the most important fruit crop of Himachal Pradesh, which constitutes about 49 percent of the total area under fruit crops and about 79 percent of the total fruit production. During 1950-51, the area under apple cultivation was 400 hectares, it increased to 3,025 hectares in 1960-61 and it further increased to 1,12,634 hectares in 2017-18. Similarly, apple production was 7,77,126 MT during 2015-16, 4,68,134 in 2016-17, 4,46,574 in 2017-18 and around 3,59,540 MT in 2018-19.

The total area under Horticulture in Himachal Pradesh is 2,30,852 Hectare and total Fruit Production is 5,65,307 MT. Till March 2019, 1,15,96,672 boxes had arrived and 35000-40000 trucks are engaged in this work.

## Marketing Schemes of Himachal Pradesh Agro Produce

Under Section 3 of The Himachal Pradesh Agricultural and Horticultural Produce Marketing

(Development And Regulation) Act, 2005 Board, which is a corporate body, has been established for development, promotion and regulation of agricultural marketing.

## Objectives of the Himachal Pradesh State Agricultural Marketing Board

The objective of the board is to improve and provide better facilities for sale, purchase, storage and processing of Agricultural and Horticulture Produce of Himachal Pradesh.

Himachal Pradesh State Agricultural Marketing Board and department of agriculture regulate marketing of agricultural produce of the state. It plays an important role in development of efficient marketing system, promotion of agri processing, establishment and proper administration of markets for agricultural produce in the State of Himachal Pradesh. It ensures level playing field for competitive markets to operate through setting of minimum standards for facilities, procedures and systems, thereby promoting the establishment of well administered and efficient infrastructure for marketing of agricultural produce in the state. The Director of Agriculture Department of Himachal Pradesh has been designated as Director of Agricultural Marketing.

The state has total 59 market yards including 10 Principal Market Yards and 49 Sub Market Yard.

## Structure of the Market Yards

In Market yards we have constructed 1,101 shops out of which 927 have been allotted and the allotment of 174 in pipeline.

Apart from this, the following facilities like banks, Auction platform, Rest houses/lobbies etc. in the yards. The average density of Market yards is 943 Square metre in Himachal Pradesh.

HPSAMB has also constructed 32 collection centres at strategic location throughout state for collection of Fruits and vegetables.

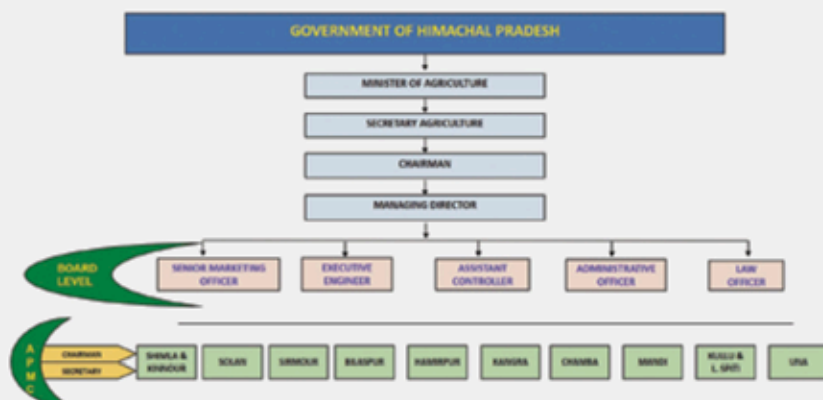
## Himachal Pradesh Horticulture Development Project (HPHDP)

An amount of Rs 30 crore has been allocated for construction of two new markets at Mehndali (Shimla) and Bandrol (Kullu). Rs 61 crore will be utilised for the renovation of 14 Agricultural Wholesale Markets and further Rs 36 crore for automation and other basic amenities. The estimated cost of this project is Rs 126.35 crore.

## Establishment of CA/Cold Stores In Himachal Pradesh

The CA/Cold Stores have been established in the corporate and private sector for storage of fruit crops to avoid any distress sale / glut in the market. The total storage Capacity under CA/Cold Store in both private and government sector is 67,051 M.T. There are 12 CAS of 47,171 MT and Cold Store of 5,000 MT in private sector. The HPMC storage capacity of CAS is 3380 and cold storage is 11,500 respectively. More than 70 percent CAS/CA store are owned by the private entrepreneurs.

## ORGANISATION SET UP OF HP STATE AGRICULTURAL BOARD







Reliance, Adani, Agrifresh and other private industrial houses and further HPMC has established CAS in state. HPMC has installed around five grading unit of 4-5 MT/hr capacity in state.

### Processing Of Fruits and Vegetables by the Horticulture Department

The department of Horticulture has opened Fruit Canning Units at Naubahar (Shimla), Nagrota Bagwan (Kangra), Dhaulakuan (Sirmour), Shamshi (Kullu), Nihal (Bilaspur), Rajgarh (Sirmour), Rajpura (Chamba) and Reckong Peo (Kinnaur) and further sale counters at 33 locations in the state.

With the World Bank financial assistance, H.P. Horticulture Produce Marketing & Processing Corporation (HP State Government Undertaking), popularly known as HPMC, was incorporated on June 10, 1974. The mandate of this organisation is to provide post-harvest facilities to the fruit growers of the state for higher returns for their produce from the market.

The infrastructure has been upgraded in a phased manner by commissioning advanced computerised apple packing / grading lines with controlled atmosphere storage (CAS) facilities in the fruit growing areas of the state. This has helped farmers in order to avail technology to meet the market

requirements. HPMC combats the problems like marketing of fruits and processing of all types of surplus fruits.

### Fruit Processing Facilities

HPMC has two modern fruit processing plants, beside a leased processing unit at Jabli, to maintain high standards in the field of fruit processing.

### Post harvest Facilities

Computerised apple grading/ packing lines have been installed at Gumma (Kotkhai), Jarol (Tikkar) and Oddi (Kumarsin) with financial assistance from APEDA. These state of the art post-harvest facilities have washing, color grading, waxing and drying facilities to deliver international grade apples from Himachal Pradesh.

Modern Controlled Atmosphere Stores have been set up at Gumma, Jarol (Tikkar), Oddi, Rohru and Patlikhul with storage capacity of 640 MTs to control the supplies of apples and eliminate wastage. Cold storage facilities with total storage capacity of about 11,500 MTs have been created in terminal markets like Delhi, Mumbai, Chennai and Parwanoo for maintaining the supplies.

Two modern fruit and vegetables pack houses with cold room facility has also been commissioned at Ghumarwin, Bilaspur district and Nadaun, Hamirpur

district with the financial assistance of APEDA, with an aim to provide modern facilities for grading/packing of fruit and vegetables grown in low lying areas of Himachal Pradesh.

In the absence of proper roads, farmers are compelled to sell their produce to local traders. In order to improve the situation, the proposal of roads is submitted to the state government is being sensitive to the farmers problem execute the proposals on priority basis. The cost of roads and tunnels is also much higher in hilly terrain. Ropeways are also used to transport apple and other fruits from mountains/hill peaks to roads.

### New Horizons of Technological Innovations

Weigh in Motion (WIM) have been installed at the entry gate of market yards in order to keep check on the arrival of commodities. The WIM have been installed in the following Mandis. WIM have been installed in the following e-NAM markets:

Integrated Axle Slow Speed Weigh Axle weights in Motion (WIM-SS) either statically or dynamically up to a speed of 15 KMPH. The Integrated Axle Medium SPEED Weigh Axle weights in Motion (WIM-MS) have been proposed for the next phase which weighs Axle weights in Motion either statically or dynamically up to a speed of 45 KMPH. Capacity of WIM 40 Ton/axle and in motion accuracy is +/- one percent FSR up to speed 5 Km/Hr and, +/- two percent FSR up to speed 10 Km/Hr and +/- three percent FSR up to speed 15 Km/Hr.

### Fortification of Food an old era tradition

There are fewer facilities in the tribal areas. The millets are a good source of dietary carbohydrates, protein, calcium thiamin and magnesium and







micronutrients. The incorporation of millets in the diet can help to eradicate nutritional deficiencies. The use of millet flour is used for iron and zinc fortification tribal areas.

The healthy and better diet in form of the chapatis of Buckwheat and finger millets are eaten by the tribal population which are rich in aforesaid micronutrients. Sometimes the flour of buckwheat and finger millets is mixed with flour of wheat etc. in order to combat the micronutrients deficiency.

### Role of technology in achieving progress of the Agriculture sector of Himachal Pradesh

Introduction of HVY of seeds, INM (Integrated Nutrient Management), IPM (Integrated Pest Management), Bio-agents, mechanisation and use of remote sensing and Biotechnology has contributed to increase in production.

Release of bioagents like egg parasitoid *Trichoderma chilonus*, *Trichoderma japonicum*, *Trichoderma brasicae* etc., have contributed in combating pest problem. Biofertilizer *Rhizobium*, *PSB*, *Azotobacter* have also contributed meet the nutrient requirement.

In organic agriculture, traps and lures and plant based insecticide, fungicide and repellent, cow urine, dung and other formulation have played an important role in increase of production.

HPMC was established with the objective of marketing of fresh fruits and processing of all types of surplus fruits. It has developed the most modern system of marketing in the country.

E-National Agricultural Market (eNAM) was launched in 2016 by the Prime Minister of India with a vision to bring transparency, uniformity, to realise full sale price to the growers/

WIM have been installed in the following e-NAM markets:

Sr.No.	Market Yard	Status of WIM
1.	Dhalli	Installed in all the three yards
2.	Bhattakufar	
3.	Parala	
4.	Solan	Due to NH construction and other constraints WIM installation has been delayed.
5.	Parwanoo	Installed
6.	Ponta Sahib	Installed
7.	Santoshgarh	Installed
8.	KangraJassour	Installed
9.	Bhunter	Installed
10.	Hamirpur	Installed

farmers and to provide whole country such as Big Bazaar, for trading agricultural commodities. Himachal Pradesh also made its representation with 19 mandies on eNAM portal. The two mandies namely APMC Dhalli and Solan were chosen as pilot mandies. Subsequently five more mandies and thereafter 12 mandies were integrated in phased manner with E-National Portal in 2016 & 2017 respectively.

The Government of India, Ministry of Agriculture provided an amount of Rs 5.70 crore i.e. Rs 30 lakh for each Mandi to create basic infrastructure like as Computer and IT hardware, Assaying labs, Setting up of weigh bridges, awareness campaign and manpower under e-NAM. The Agriculture Marketing Board facilitated the APMCs and created required infrastructure in all the 19 eNAM Mandis.

At present, computers and IT hardware with Internet leased lines have been

provided in each eNAM mandi, Assaying labs and weighing in motion have been established, awareness camps have also been organised, therefore, as a result up till now 1,18,345 farmers, 1,919 traders and 1,100 commission agents have been registered under eNAM in Himachal Pradesh.

An approximate amount Rs 39.47 crore has been transferred directly to the bank accounts of 2925 farmers through e-NAM gateway which is the second highest in the country after Uttarakhand state.

Thus Himachal Pradesh emerged best on all the indicator parameters that have been fixed by the Government of India and hence to promote and bring healthy competition amongst the states, the Solan Mandi of APMC Solan of the state was adjudged number one amongst the hilly States for its best infrastructure and physical trade on eNAM Portal and honored with Prime Minister Award in 2017.

# INDIAN MARKET is Moving Towards Hyperscale Data Centres



**Prasanna Sarambale**  
Data Centre Business & Group Head- Business  
Development at Sterling & Wilson

The Indian market is moving towards Hyperscale Data Centres and is witnessing an influx of established foreign Colocation providers, says **Prasanna Sarambale**, CEO Data Centre Business & Group Head- Business Development at Sterling & Wilson. In this interview with **Elets News Network (ENN)**, Sarambale talks about the significance of data and technology in Indian market vis-à-vis the world. He also shares the vision and future plans of Sterling & Wilson.





### **Tell us about the evolution and vision of Sterling & Wilson.**

Sterling & Wilson started off as an Electrical projects company and has now evolved as a Global EPC company with focus on MEP, Turnkey Data Centres, Renewables (Solar & Wind), Hybrid & Energy Storage, Cogen Solutions (Gas based energy solutions and Waste-to-energy), Transmission & Distribution (EHV Substation), Diesel Generators and HT/LT Panels and Independent Power Producers.

### **What are the flagship products and services offered by your organisation?**

We, at Sterling and Wilson, offer specialised EPC services for the Data Centres. We offer end-to-end services throughout the lifecycle of data centre, i.e., selection of site, concept design, detailed design engineering, construction, MEP services, testing and handing over including 24x7 physical infrastructure O&M in addition to the approvals and liaising. We offer vendor agnostic solutions instead of being tied-up to a particular technology, meeting client's requirements. This makes us a one-stop Data Centre solution provider.

### **What are the initiatives or new areas you have ventured into recently?**

We have forayed into Modular Data Centre offerings which provide quick deployment time and are certified to withstand various physical and logical risks like explosions, fire, data phishing etc. This solution reduces the client lead time to Go-To-Market and consequently provides a better Return on Investment for them. Unique features of Room-in-room solution help to monitor environmental factors that can result in downtime and facility damage.

Our unique Modular Room-in-Room Solution provides flexibility and adaptability, ease of assembly, floor space saving and much-improved security. Its patented German Insulation Technology gives the highest degree of fire & temperature rise protection which is tested and certified by the European Certification Board having the most stringent standards. With some of the unique features like Burglary Protection, Falling Debris Protection, Stagnant Water Protection, Explosion Protection etc, our Room-in-Room solution brings in the best in class alternative to the traditional brick and mortar data centres with a much higher level of security and reliability.

### **Who are your prominent clients or customers? Do you have any collaboration with the Government of India?**

In the past we have executed multiple prestigious projects for esteemed clients like Department of IT (Government of Rajasthan), Vodafone, National Stock Exchange, NSDL e-Gov, Siemens.

*"We are witnessing an evolution in the data centre model with a gamut of technological developments for enterprises. With the deployment of high-density racks in a cloud environment, there is an increasing need for customised power and cooling solutions."*

### **Tell us about the partnership with Uptime Institute?**

Sterling & Wilson will promote and facilitate the Uptime Institute certifications {Tier Certifications of Design Documents (TCDD), Constructed Facility (TCCF), and Operational Sustainability (TCOS) as well as the M&O Stamp of Approval for management and operations}. Sterling & Wilson will be also providing value added services to enable these certifications. This alliance also includes Sterling & Wilson as a promoter of the globally recognised ATD, ATS and AOS

educational accredited designations. The collaboration will enable both Uptime Institute and Sterling & Wilson to expand business further in India, Nepal, Sri Lanka, Bhutan and Bangladesh. All Uptime Institute services will be performed directly by Uptime Institute.

This collaboration of both the companies will in turn be beneficial for many enterprises to improve their performance, efficiency, and reliability of business-critical infrastructure.

### **What are the technology deployment done in your products/services?**

We are witnessing an evolution in the data centre model with a gamut of technological developments for enterprises. With the deployment of high-density racks in a cloud environment, there is an increasing need for customised power and cooling solutions. Customers are scouting for micro-level power, cooling and space monitoring through the software like DCIM.

We use some of the latest tools including Revit, a 3D modeling software used for critical data centre co-ordination drawings, HAP (Hourly Analysis Program) for data centre HVAC designing, Computational Fluid Dynamics (CFD) for Temperature and Airflow pattern study in Data Centre, ETAP for Electrical Analysis and ETAB and StaadPro for Structural Analysis.

### **How are you leveraging the technology like Artificial Intelligence, Machine Learning, Blockchain etc.?**

We increasingly support data centre infrastructure with customised solutions that can digitally transform businesses and also maintain the scalability and flexibility. Our solutions ensure a robust and rationalised IT



**“We have forayed into Modular Data Centre offerings which provide quick deployment time and are certified to withstand various physical and logical risks like explosions, fire, data phishing etc.”**

Infrastructure, as well as technological components that fit with our client's requirements. Edge computing, 5G, Big data analytics, the Internet of Things (IoT) are impacting the future data centres in a big way. They call for increased bandwidth requirement, critical network cabling and multi-layered operational security in the facilities.


The Indian market is moving towards Hyperscale Data Centres and is witnessing an influx of established foreign Colocation providers. Cloud providers are expanding their presence rapidly across the world, with India being one of their focused markets.

Recent RBI directive makes it mandatory for fintech firms to store financial transactions data within national boundaries.

Developments in cloud computing and next-generation security support us in utilising data in an efficient manner. Our Data centre division has the capability to construct and maintain the entire infrastructure complying to global standards of the business.

### **What are your future plans and initiatives for the upcoming years?**

The potential for data usage, security and sensitivity is expected to grow significantly across the Globe. We are the largest Data Centre EPC company in India (based on order booking). We plan to continue our expansion globally and venture into new markets of Middle East, Africa and APAC.

As all Data Centres are heavy on power and cooling requirements, we are well equipped by virtue of our presence in MEP, Transmission and Distribution (EHV Substation), Diesel Generators etc., to become a prominent player in Data Centres, globally. It promises us a huge potential to partner with the best names and projects not only in the country but across the globe. 





## India Reiterates Support for Afghanistan's Regional Security and Prosperity at **SCO Summit**

India's initiatives through SCO is setting a regional security architecture for Afghanistan and with this policy, India is making efforts to forge substantive links, engage in deeper economic and political integration and foster people-to-people contact, writes **Neelapu Shanti**, a journalist formerly associated with the Government of Afghanistan.

India and Afghanistan share an exceptional long friendship that once again reflected during the Shanghai Cooperation Organisation Summit-2019 (SCO) held in the Kyrgyz capital Bishkek. Prime Minister Narendra Modi, said, "A united, peaceful, safe and prosperous Afghanistan is an important factor for the stability and security in the SCO region. Our aim is to support the efforts of the government and the people of Afghanistan for an Afghan-led, Afghan-owned and Afghan-controlled inclusive peace process", spells India's diplomacy to raise Afghanistan's issue with all the

regional countries and wants the war-torn country to be an active part of the regional infrastructure development initiatives.

India's initiatives through SCO is setting a regional security architecture for Afghanistan and with this policy, India is making efforts to forge substantive links, engage in deeper economic and political integration and foster people-to-people contact. Afghanistan has been receiving enormous support for the activation of the roadmap for further action of the SCO-Afghanistan Contact Group.

The SCO's primary objective is to combat religious, extremism and separatism in the region and in context to Afghanistan it is important to understand the role of SCO and the measures for cooperation between SCO and Afghanistan. To counter the challenges of extremism in Afghanistan is the main reason for the establishment of SCO.

Determined to ensure regional security and stability the SCO member states are forging strong collaborations. "In this context, they support the work of the government and people of Afghanistan (with support from the international

community) for restoring peace and ensuring the countries sustained development. The SCO Member States once again express their willingness to facilitate a political settlement under the guidance of the people of Afghanistan and with their involvement on a bilateral basis and within the framework of the SCO-Afghanistan Contact Group".

### India-SCO support in Afghanistan

The members of SCO focussed on to implement on expanding and deepening cooperation in trade, finance, investment, transport, energy, agriculture, innovation, cutting-edge technology, etc. Modi elucidated India's cooperation through HEALTH template that explains as H for Healthcare Co, T for Terrorism free society, H for Humanitarian Cooperation, and H for Healthcare cooperation. With regard to India's cooperation with Afghanistan is represented by its effort and contribution via humanitarian and development assistance. Time and again India has conveyed its willingness to work closely with the SCO member states in an effort to bring peace, prosperity and stability in Afghanistan. On sidelines of the SCO summit, Modi assured President of Afghanistan Ashraf Ghani that India will support for a "legitimate government is chosen through the democratic process".

While focusing on effective connectivity of Afghanistan, Chabahar port project and Air Corridor programme are indeed signature achievements of India which has been purposeful and productive. India's cooperation with Afghanistan has made steady headway as the scope of cooperation has been broadening and the levels are increasing. In this backdrop, multilateral organisation like SCO is an important bloc to demonstrate solidarity aimed at mutual benefit and common development in the region. India-Afghanistan has made notable progress in building people-to-people contact and the partnership is



based on the amalgam of development and Strategic Partnership Agreement of 2011. The agenda is spelled out through education and skills enhancement, infrastructure development, information technology, scholarship programmes, healthcare etc.


In May this year India has provided Mi-24V helicopter gunships from Belarus to the Afghan Air Force (AAF) at an air base in Kabul. The Shahtoot Dam project funded by World Bank and proposed to be constructed by India is in the pipeline. Once initiated would enhance water supply facilities, purification system and the dam will provide potable water to more than two million people in Kabul. India's long experience in implementing projects and trading in Afghanistan has turned out to be realistic. The volume of trade between the two countries has sporadically crossed over the USD 900 million in 2018-19. India has created a lot of investment opportunities in Afghanistan, particularly the emerging sectors of mining, infrastructure, telecommunications, agro-based and small scale industries, health, pharmaceuticals, education and IT.

### Role of SCO member states in Afghanistan

In the context to Afghanistan, SCO aims to respond to the immediate threats

arising from terrorism and drug trafficking and the idea emerged from a collective demand from the regional countries to combat them. The SCO's relevance will be determined by its ability to effectively address the economic and security problems of the regional countries including Afghanistan. The international community needs to strengthen the Afghan state. It is important to forge a diplomatic regional consensus in support of long term stabilisation in Afghanistan.

The SCO comprises eight member states, namely India, Kazakhstan, China, Kyrgyz, Pakistan, Russia, Tajikistan, and Uzbekistan. The SCO counts four observer states, namely the Afghanistan, Belarus, Iran, and Mongolia. The SCO has six dialogue partners, namely the Azerbaijan, Armenia, Cambodia, Nepal, Turkey and Sri Lanka.

India has been playing a crucial role to envision and strengthen healthy cooperation in the region. India offers limitless opportunities and in sync with the priorities of the regional countries including Afghanistan as a top priority in the SCO. To promote greater understanding of the SCO like platform it is important to take forward the spirit of consultation that will be a resource bank for furthering healthy relations in the region. 





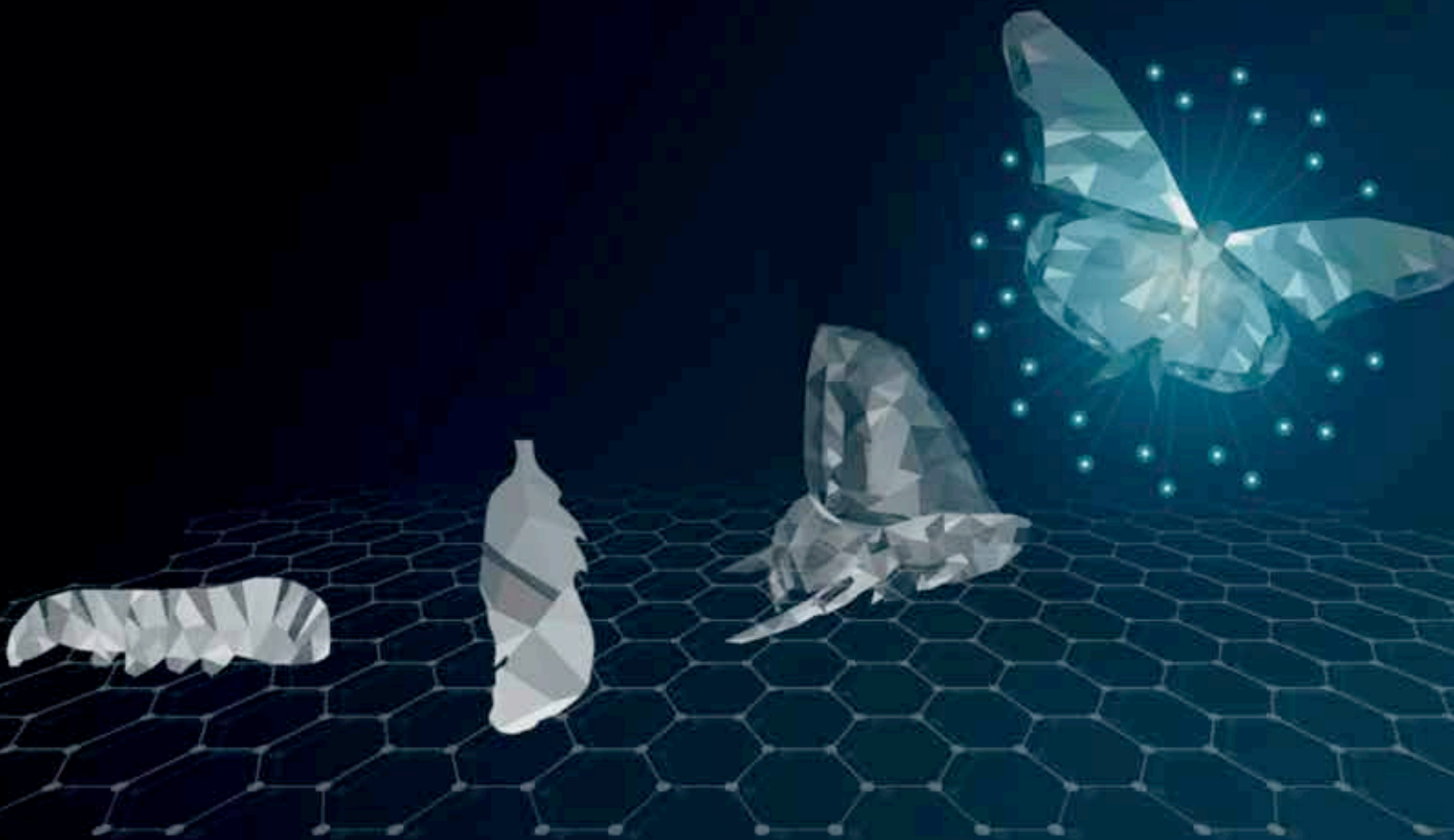
# EVENT CALENDAR 2019

EVENT NAME	PLACE	MONTH
<b>URBAN / SMART CITY / IT / INNOVATION / ENERGY/AGRICULTURE</b>		
Cotton & Agro Commodity Marketing Innovation Summit	Mumbai	23 July 2019
National Urban Innovation Summit	Lucknow	27 July 2019
5 <sup>th</sup> Urban Development Summit, Jharkhand	Ranchi	2 August 2019
6 <sup>th</sup> Urban Development Summit, Gurugram	Gurugram	7 August 2019
Public Transport Summit, Pune	Pune	22 August 2019
National Urban Development Summit, Jodhpur	Jodhpur	August 2019
Smart City Summit, Pune	Pune	September 2019
<b>TECHNOLOGY / BFSI</b>		
4 <sup>th</sup> BFSI CTO Summit	Mumbai	29 August 2019
BFSI Lending Summit	Mumbai	September 2019
8 <sup>th</sup> NBFC100 Tech Summit	Chennai	October 2019
3 <sup>rd</sup> BFSI Cloud & Security Summit	Mumbai	November 2019
<b>HEALTH</b>		
Healthcare Summit, Jharkhand	Ranchi	8 August 2019
5 <sup>th</sup> Healthcare Innovation Summit	Chennai	August 2019
6 <sup>th</sup> Healthcare Innovation Summit	Ahmedabad	October 2019
7 <sup>th</sup> Healthcare Innovation Summit	Delhi	December 2019
<b>EDUCATION</b>		
14 <sup>th</sup> World Education Summit	New Delhi	9-10 August 2019
12 <sup>th</sup> Higher Education & Human Resource Conclave	Bengaluru	14 September 2019
13 <sup>th</sup> Higher Education & Human Resource Conclave	Jaipur	September 2019
15 <sup>th</sup> World Education Summit	Mumbai	22-23 November 2019
13 <sup>th</sup> School Leadership Summit	Chennai	21 December 2019
<b>SPECIAL INITIATIVES-COFFEE TABLE BOOKS/SOUVENIRS</b>		
Uttar Pradesh- Powering New India : An Industrial Coffee Table Book by Government of Uttar Pradesh	Lucknow	15 July 2019
Afghanistan- The Heart of Asia : A Centenary Coffee Table Book by Embassy of Afghanistan, New Delhi	Delhi	19 August 2019
COMESA -25 Glorious Years of Socio-Economic Integration of Eastern & South Africa : A Silver Jubilee Coffee Table Book by COMESA Secretariat, Lusaka, Zambia	Lusaka, Zambia	31 August 2019
25 Glorious Years of BECIL: A Coffee Table Book for the leading PSU under Ministry of Information & Broadcasting, Government of India	New Delhi	September 2019
Higher Education Coffee Table Book	Hyderabad	August 2019
India-Russia: Partners in Progress : Elets Special report in association with Ministry of External Affairs, Government of India	Vladivostok, Russia	15 September 2019



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