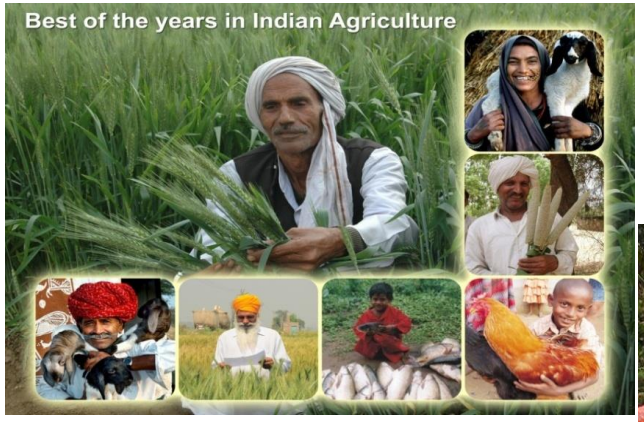
Agri-Start Ups
4
Smart Farming

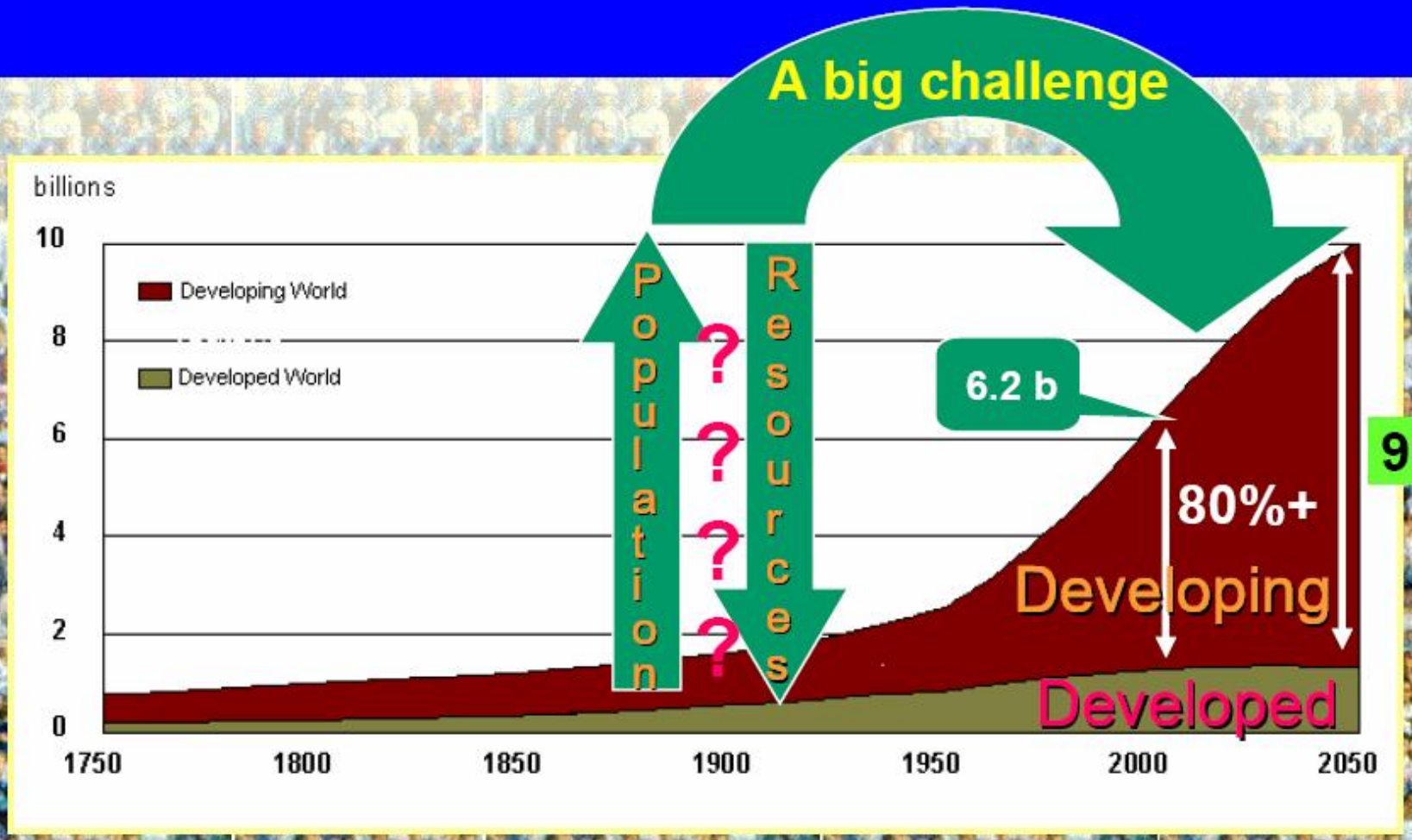
NBSC **NABARD Chair, Bengaluru** **22 February 2019**



MDGs to SDGs…

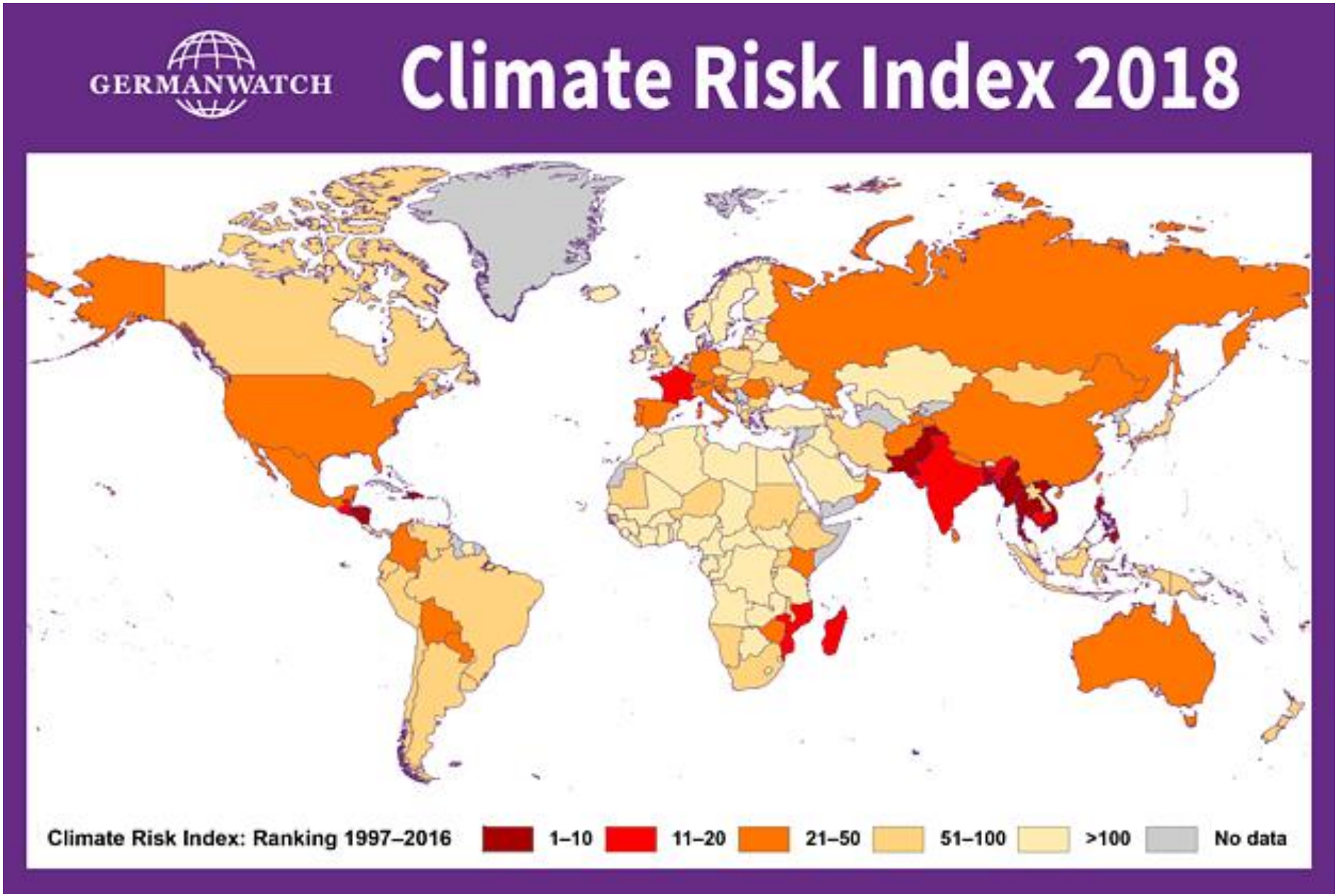
1,2,3,12,13,14,15

Population growth continues

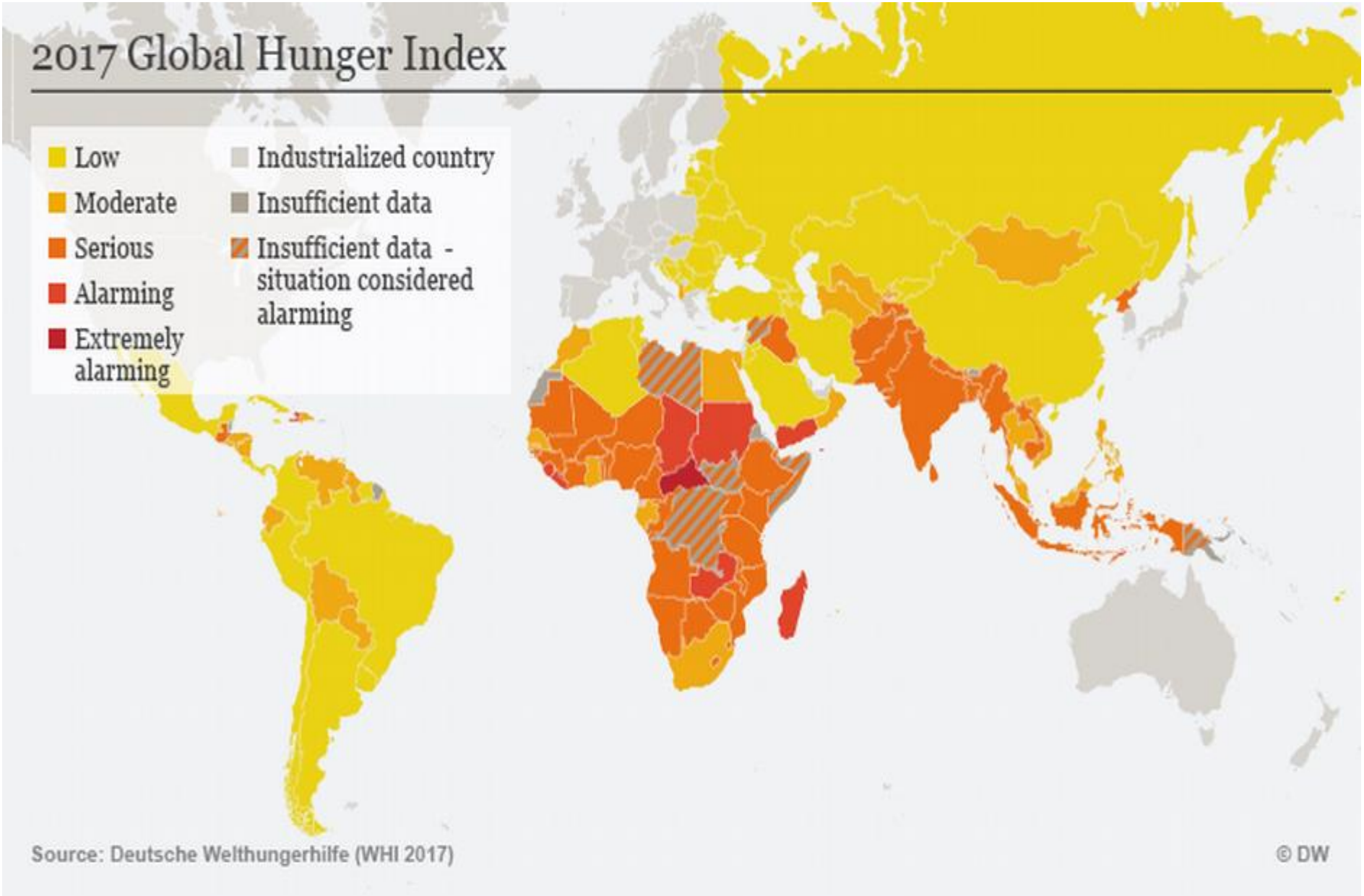


Sources: UN Population Division and Population Reference Bureau

World Map of Global Climate Risk Index, 2018



Global Hunger Index, 2018 (103/119)



The Ecological Footprint

India Today…

- > 17% of the world's human & 11% livestock population and counting
- 4.2% of the world's water
- 2.4% of the world's area
- 142 m ha cultivated & 60 m ha net irrigated
- 138% cropping intensity
- 52% of population earns livelihood in agriculture
- 13.9% contribution in GDP
- ~10% earning of total exports









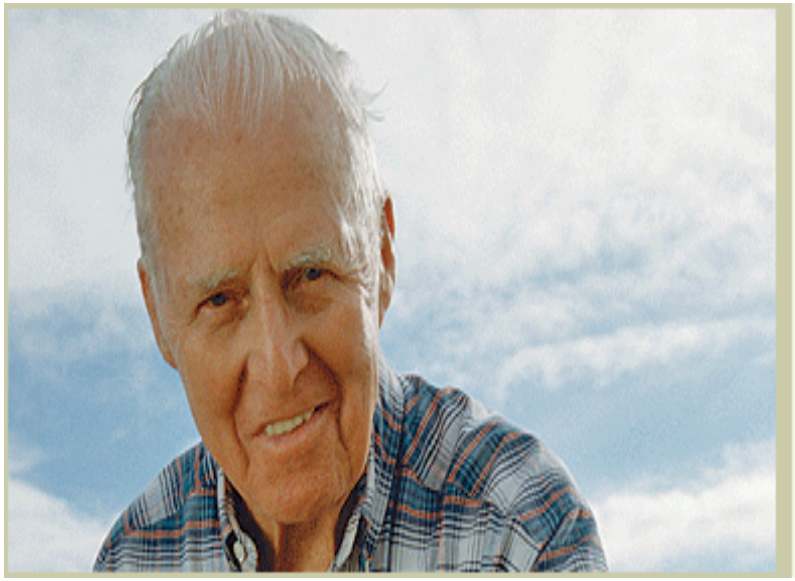




If agriculture fails, what else can succeed;
If agriculture succeeds, what else can fail?

Norman E. Borlaug (1914-2009):
Revolution/Innovation in Indian Agriculture

'I' factor for New Agriculture in India

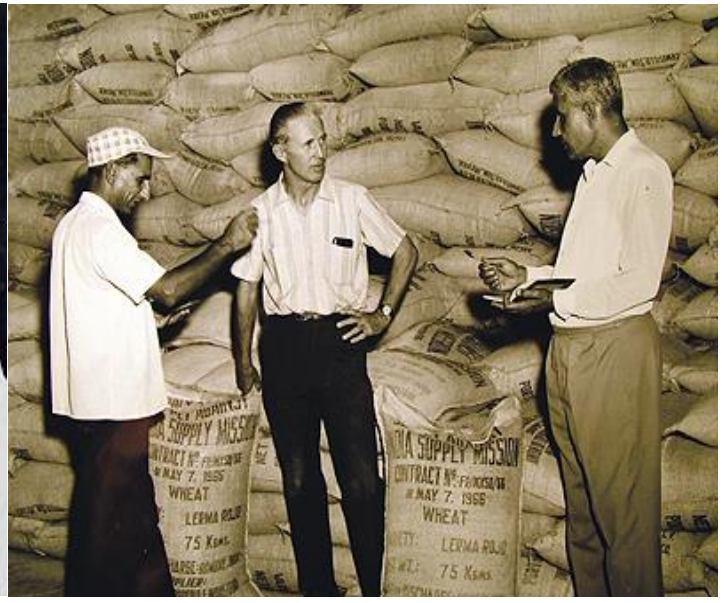


NOBEL PRIZE
FOR PEACE

"THE only way that the world can keep up with food production is by the improvement of science and technology."

~ Inducted: 1971 ~

- Innovations in agriculture
- Inputs management
- Incentives for agriculture
- Investments in agriculture
- Institutional infrastructure



Small Farmer: Core of Indian Agriculture

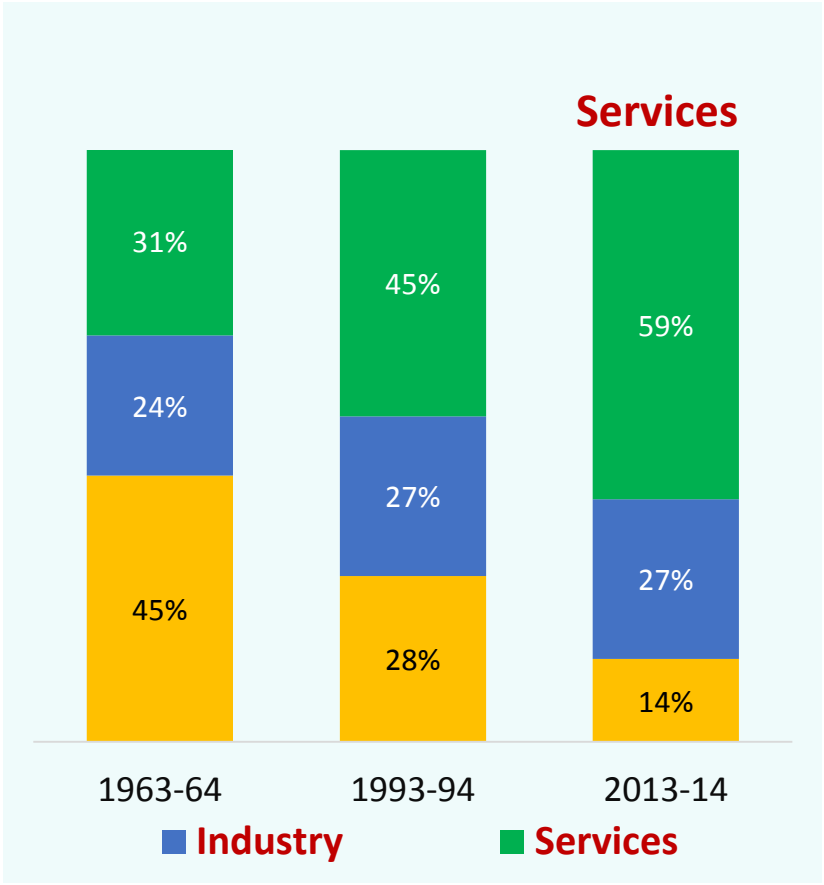
~85% farmers have < 2 ha cultivated land

	1995-96		2000-01		2005-06	2010-11	2015-16	
	Average Size of Holding (ha)	No. of Holdings (000)	Average Size of Holding (ha)	No. of Holdings (000)	Average Size of Holding (ha)	No. of Holdings (000)	Average Size of Holding (ha)	No. of Holdings (000)
Below 0.5	0.24	48127	0.24	51254	0.23	57675	0.24	64679
0.5-1.0	0.72	23052	0.72	24154	0.71	26019	0.73	28147
1.0-2.0	1.42	21643	1.42	22695	1.38	23930	1.42	24779
2.0-3.0	2.4	9628	2.39	9549	2.36	9684	2.4	9649
3.0-4.0	3.42	4633	3.43	4472	3.38	4443	3.42	4247
4.0-5.0	4.43	2809	4.42	2627	4.38	2577	4.43	2431
5.0-7.5	6.03	3028	6.03	2829	5.97	2738	6.03	2511
7.5-10.0	8.52	1255	8.51	1122	8.45	1060	8.5	933
10.0-20.0	13.21	1142	13.16	1005	12.99	896	13.13	799
20.0 above	34.57	262	34.78	226	35.43	200	36.94	174
All classes	1.41	115580	1.33	119931	1.23	129222	1.15	138348

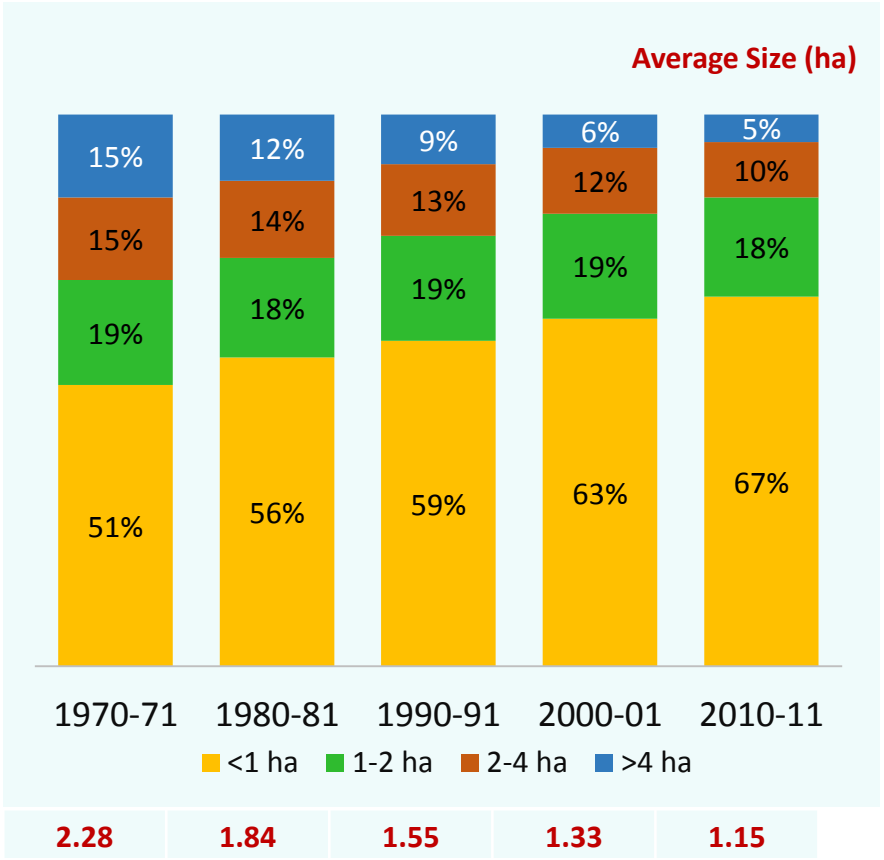
Focus on low cost, ergonomically designed, multi-purpose farm equipments

Current Status of Agriculture

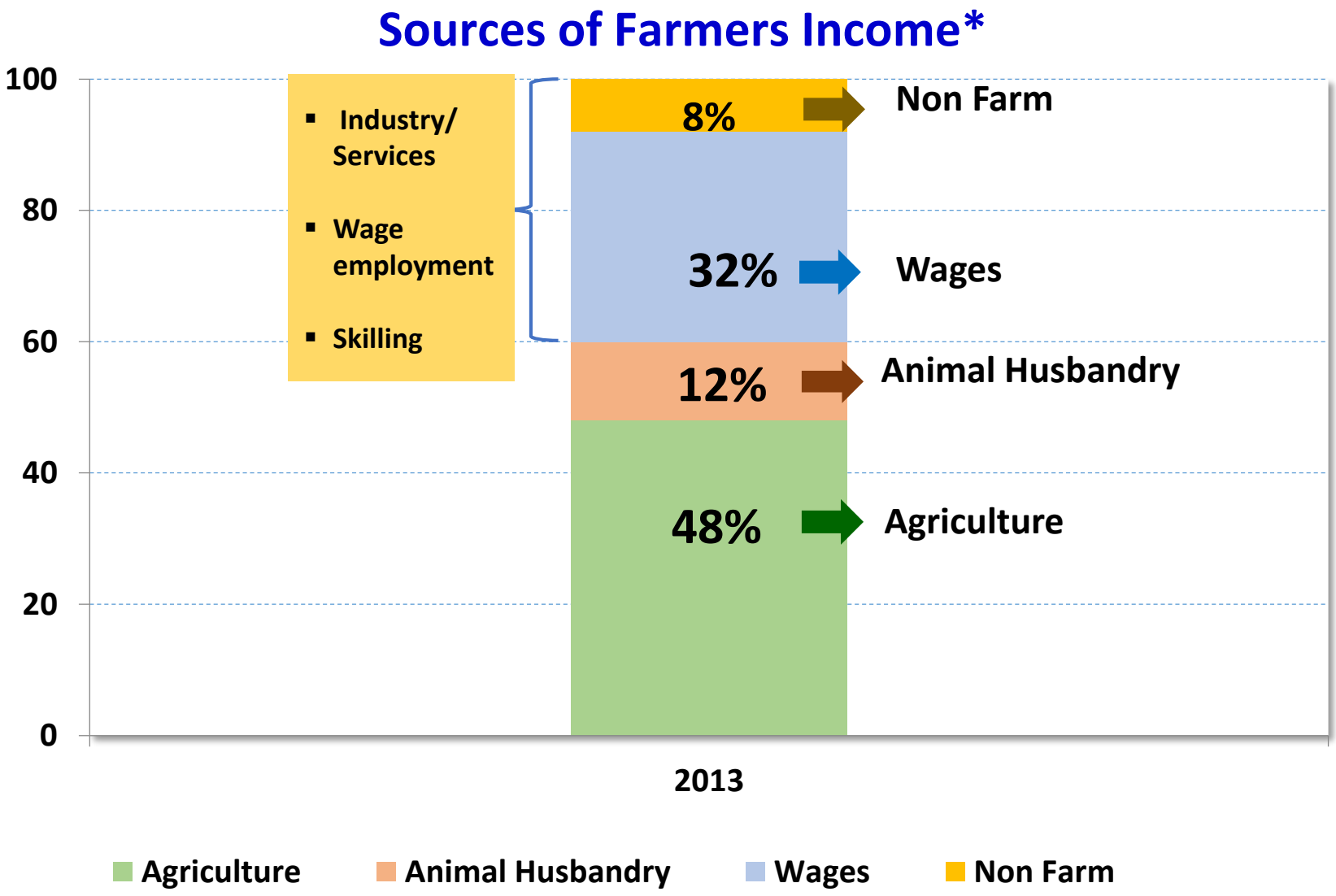
Declining share in GDP



Increasing fragmentation of land



Farmers' Income



* NSSO2013

Indian Agriculture: Then & Now

Category/ Production, mmt	1950-51	2018-19
Food grains	50.83	285
Pulses	8.41	25.23
Oilseeds	5.16	31.30
Cotton	0.52	5.93
Sugarcane (lakh bales)	57.05	376.91
Horticulture	96.56 (1991-92)	315
Milk	17.00	176.35
Fish	0.75	11.4
Egg (bn)	1830	87050
Meat	1.9 (1998-99)	7.37

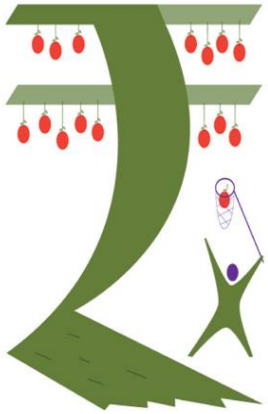
~800 mmt; 350 mmt foodgrains by 2030

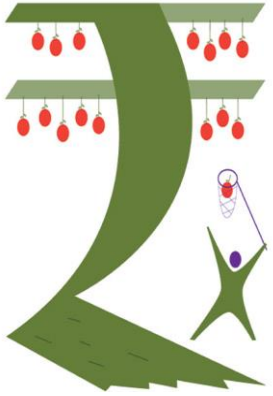
Amidst Climate change, Biotic stresses, Resource decline & degradation, 'Rurban' migration, Volatile markets

WEF, 2016: Transformational changes; 2019: Drones & AI

Doubling Farmers' Income

- Integrate
- Diversify
- Cluster
- Cut costs
- Enhance IUE
- Add Value
- Monsoon, Market, Mindset
- Produce - Protect - Process - Prosper





The Future of Food and Farming : 2050s

2050

- 70% population in cities
- ~70% increase in Agri-production anticipated

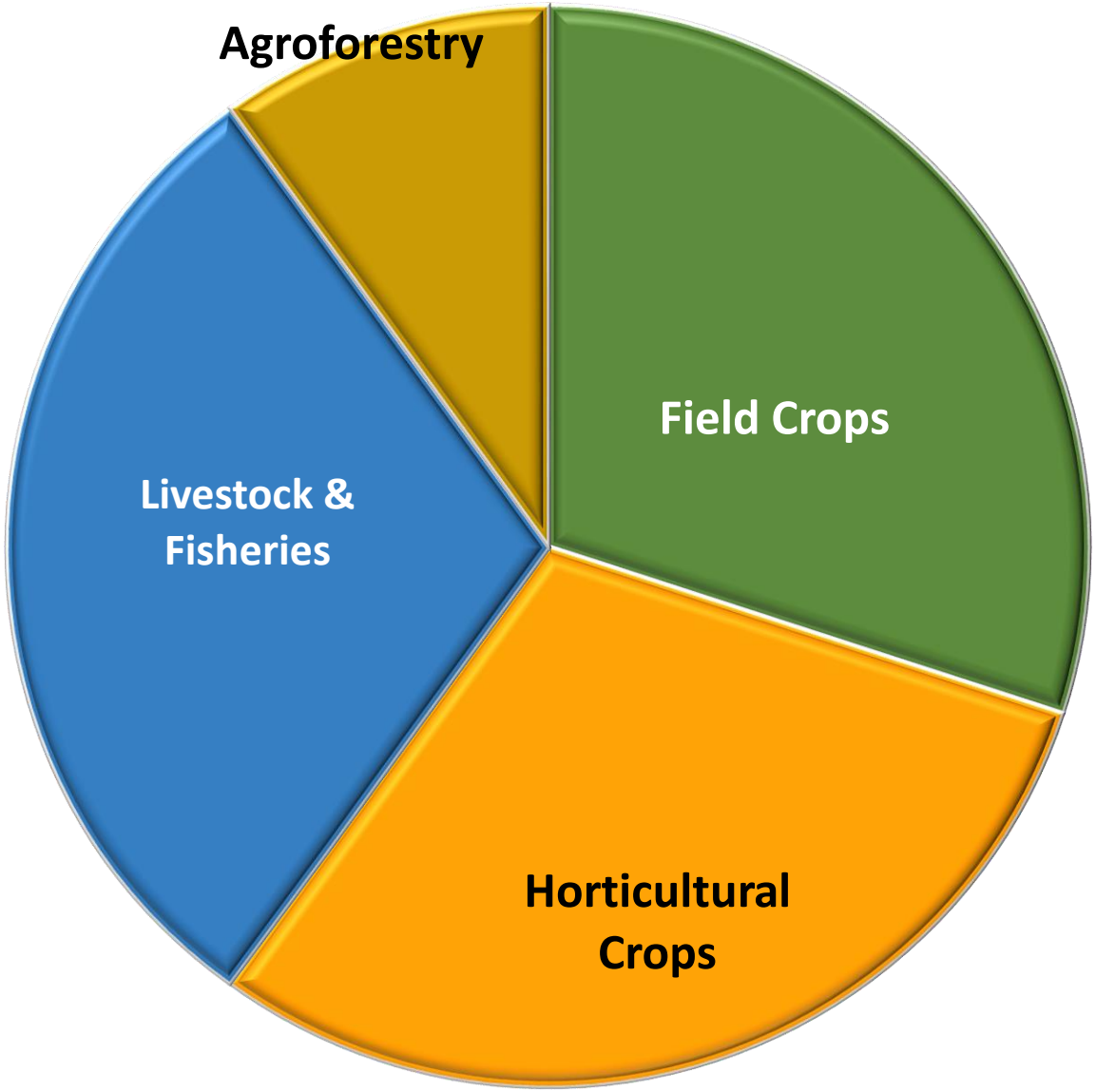
Food

Feed

Fodder

Fiber

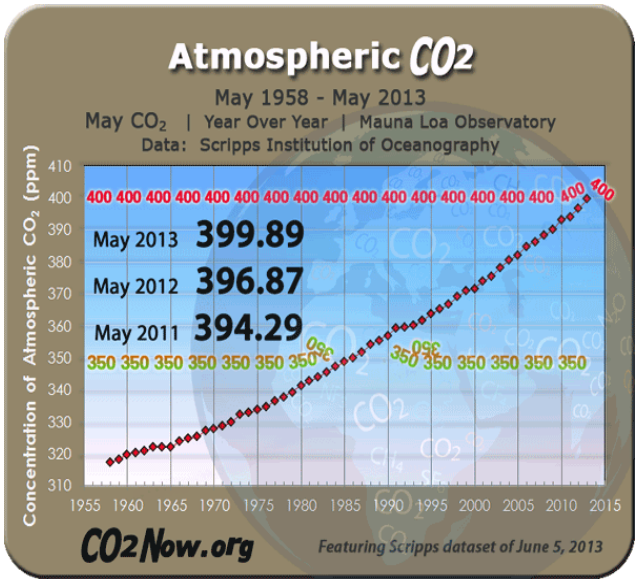
Fuel



New Agriculture

- More From Less For More
- Starch to Protein to Health Foods
- Stress Agriculture, Secondary Agriculture, Speciality Agriculture
- Agriculture-Food-Nutrition-Health-Environment-Employment
- One Health (Soil-Plant-Animal-Man)
- Skill and Youth in Agriculture

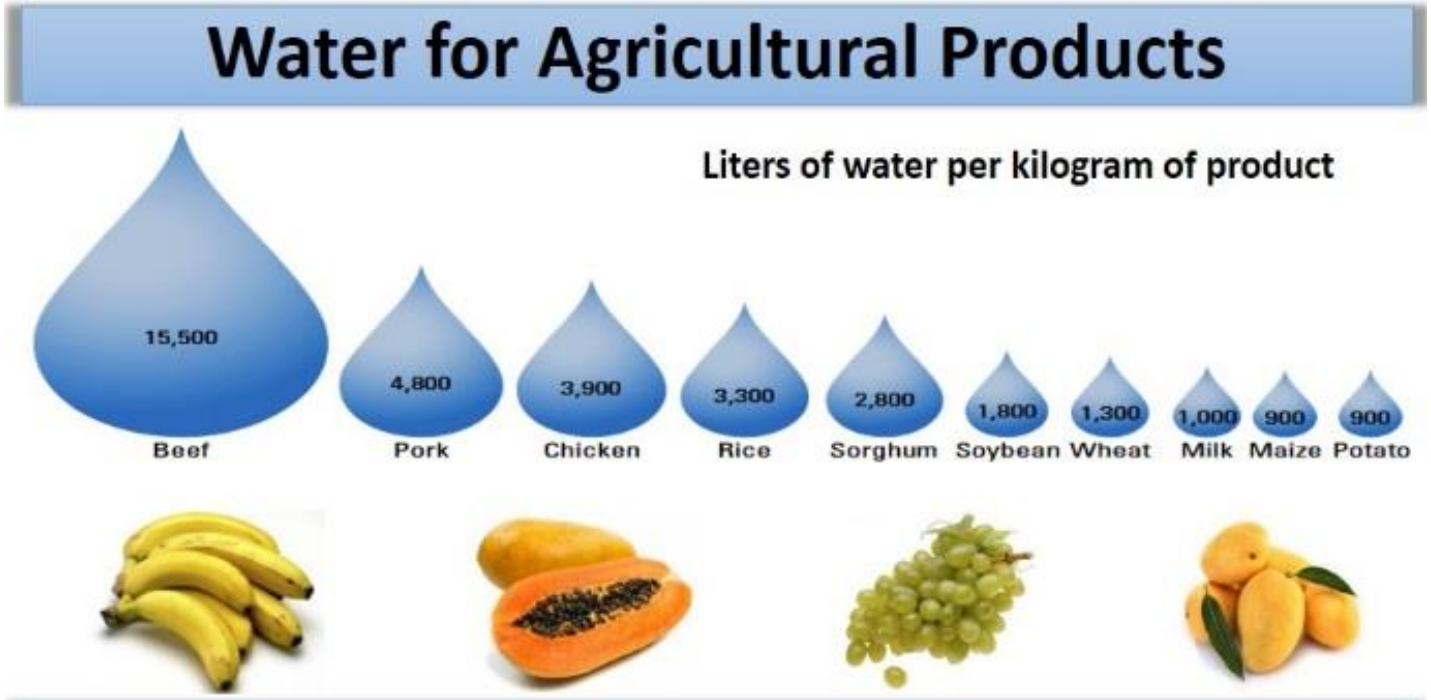


smart farming 4 small farmers



Smart farming 4
Small farmers



Nano Fertilizers

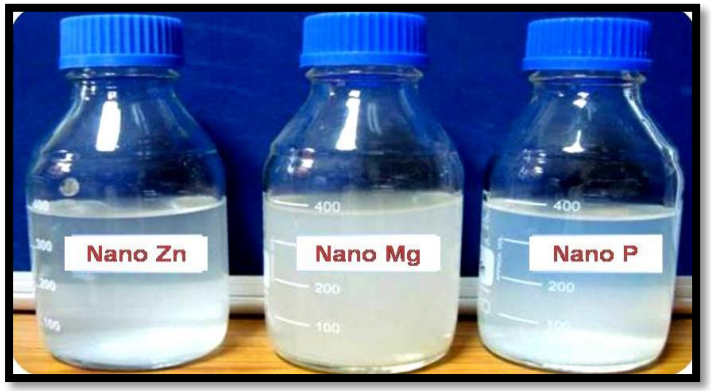

Soybean

Seed treatment with nano-ZnO @ 50 mg Zn/g seed found a successful method to meet the Zn requirement of the crop in Zn deficient areas


Maize

Developed nano rock phosphate coated urea with P use efficiency comparable to SSP

- **4G Nano based nutritional agri inputs (Phosphours, Magnesium, Zinc and Iron) using microbial secrets.**
- **Micronutrient use efficiency increased to 5-7% from 1-2 %**



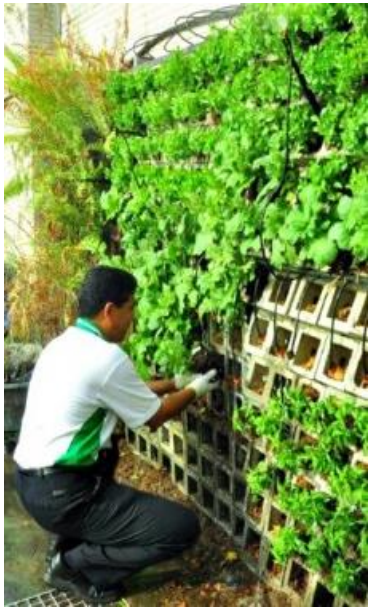
Protected Cultivation

High Value Crops

Crop Suitability

Produce 4 Profit

Urban Agriculture/Vertical Farming



Floating Horticulture

- Low cost
- Waste utilization including polythene bags
- Aqua-tourism

Vertical Farming

Envisioning Rainbow Revolution

Urban Interest: Hydroponics, Terrace Farming

- Hydroponics in Bengaluru
- Vegetable plus fish on terraces, Kochi
- Need a policy and market support

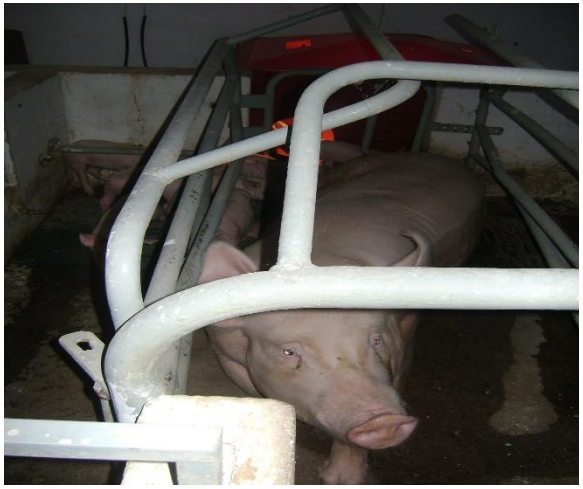
(F)Win-(C)Win-(E)Win Examples

Nutri-Farms

- Avocado
- Caper
- Cactus
- Olive
- Quinova
- Tuff

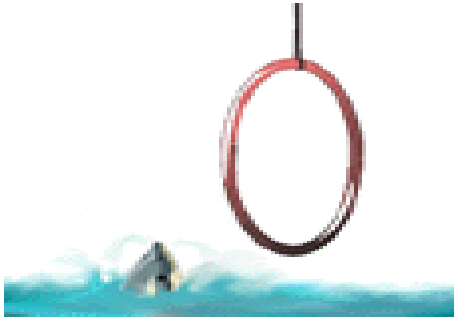
Parkia roxburghii
(tree bean)

Animal Husbandry Potentials



Look to the Seas

Opportunity: Agritourism



Sport fishing and Conservation

Ornamental Fish Farming:
Diversification and Women Livelihoods

Local Innovations Transforming Agriculture

Outreach Concept of Custom Hiring

Novel jute geo-textile developed for construction of Concrete Road

Enabling 2nd Green Revolution

Tractor operated pneumatic planter for small seeds

Litchi peeling machine

Banana fibre Extractor for textile use

Plastic mulch laying and planting machine

Cryogenic spice grinding

Doffing system for double roller gin to reduce dust emission

Palm climbing device with safety attachment

Women friendly fish vending unit

100 kW Biomass based power generation for agro enterprises

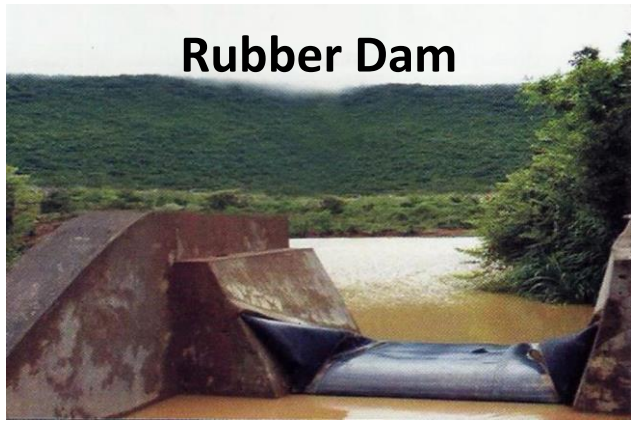
Nanocellulose Products

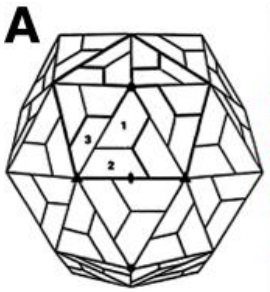
Gel

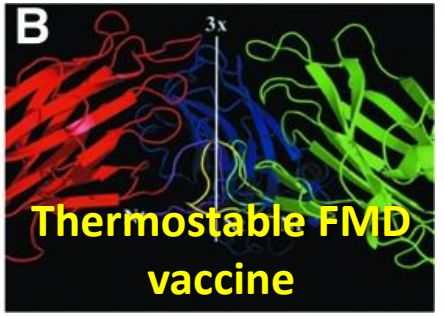
Powder

Liquid

CIRCOT Calibration Cotton - Import substitute







Pilot Plant

Application in Concrete

Application in Food Packaging

Established Nanocellulose Pilot Plant (10 kg/day) first time in India

MRIDA PARIKSHAK

Consultancy to industry to make India self -sufficient in Manufacture and export of Ginning Machinery

Fish feed, Cadalmin™ Varna* for marine ornamental fishes

Ultrasonic Sensor Based
Pomegranate sprayer

Wall nut dehuller

Drift control shield
For Boom Sprayer

MAKE IN INDIA

Cocoa pod breaker

Fruit grader

Cassava harvester

Imaging Technologies for Agriculture

Sensors and cameras in fields and farm equipment

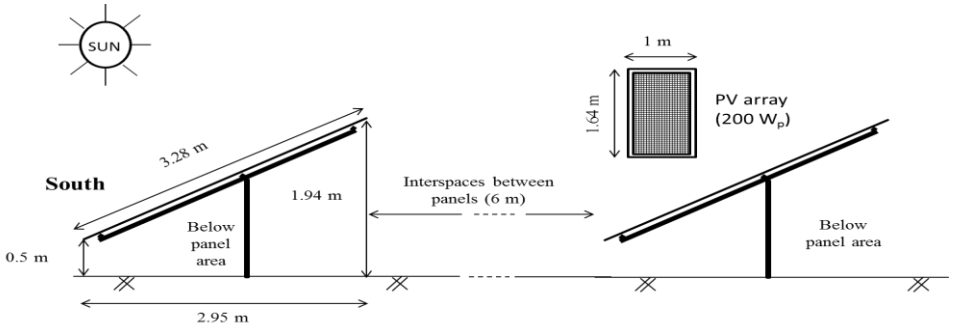
- Water levels in irrigation and soil
- Food storage
- Early detection of pests
- Emission sensors
- Tagging of livestock
- Tagging of other natural resources
- Tagging trucks and shipping containers
- Market, banking and distribution area

Sensors and Tools

Agri-Voltaic System/ Solar Farming

Agri-voltaic system

Growing crops and generating electricity through PV modules simultaneously from a piece of land



Model area: 1 ha

- Solar PV generation capacity: 0.5 MW
- Electricity generation per day: 2500 kWh
- Investment : Rs. 2.5 crores
- Income generation from electricity: About Rs 45 lakhs per annum
- Life of the system : 25 years
- Total cost recovery in 7 years
- Moong bean yield: 4 q/ha

Ridge furrow seed drill for in-situ soil moisture conservation in solar farming system

Development of solar PV sprayer for spraying agricultural chemicals in solar farming system

CIFT - SUN BOAT

Ideal for aquaculture ponds, small waterbodies, as well as recreational fishing in reservoirs and small rivers

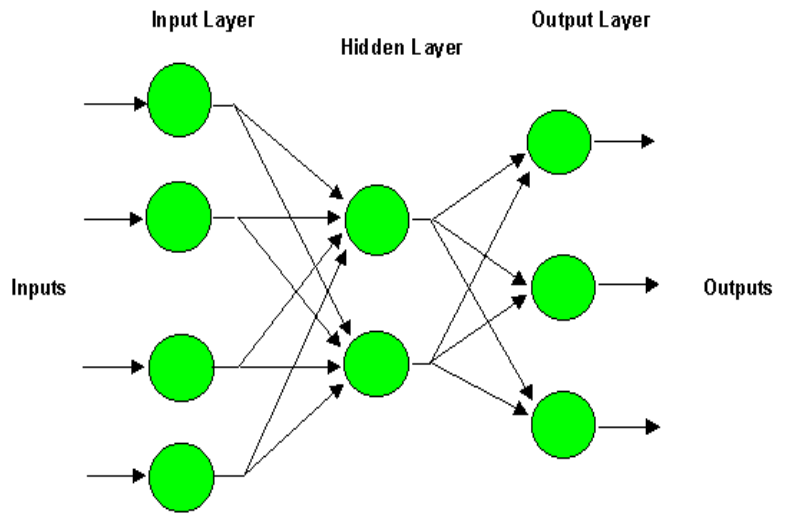
Agri-Robotics: The Future

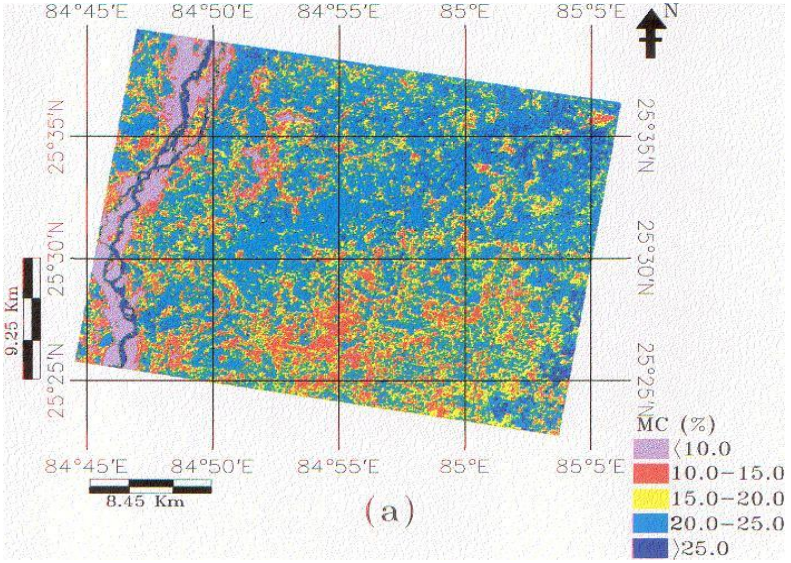
- Minimize farmers' labour in adverse climatic conditions
- Harvesting, pruning, weeding, spraying, driverless tractor/sprayer
- Sheep rearing, Milking
- Protected Cultivation
- Storage, Packaging, Transport

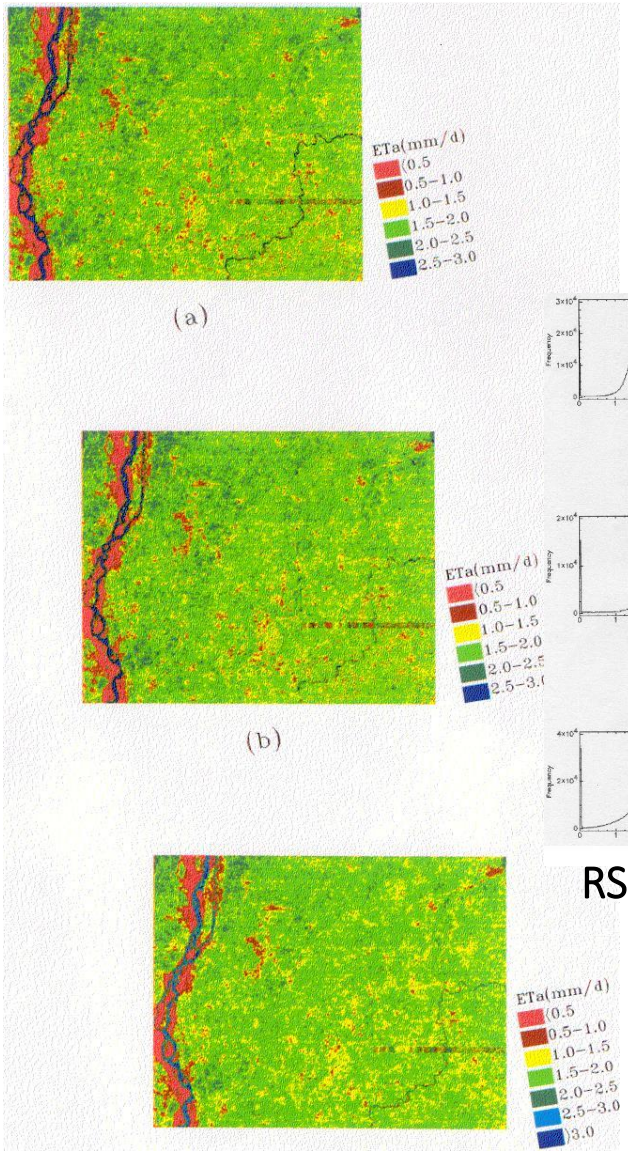
Robotic Coconut Harvesting

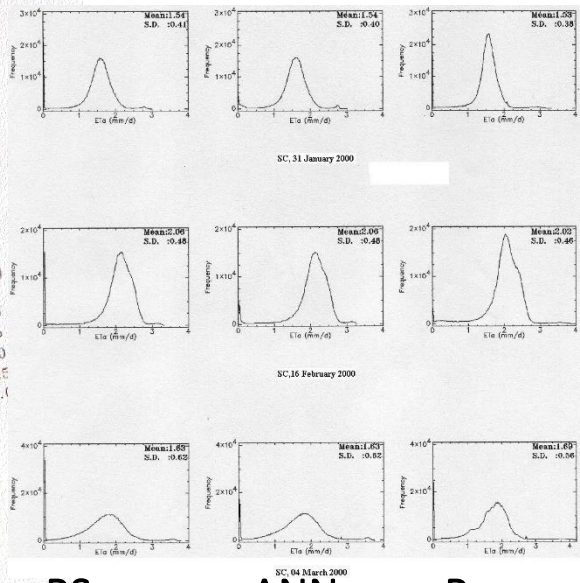
IoT in Farming

AI (Artificial Neural Network) for Water Management





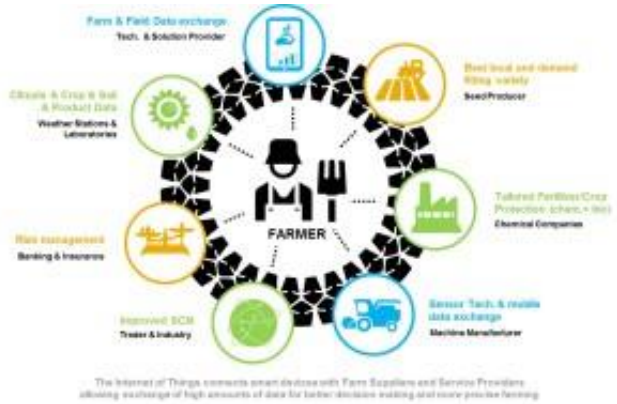


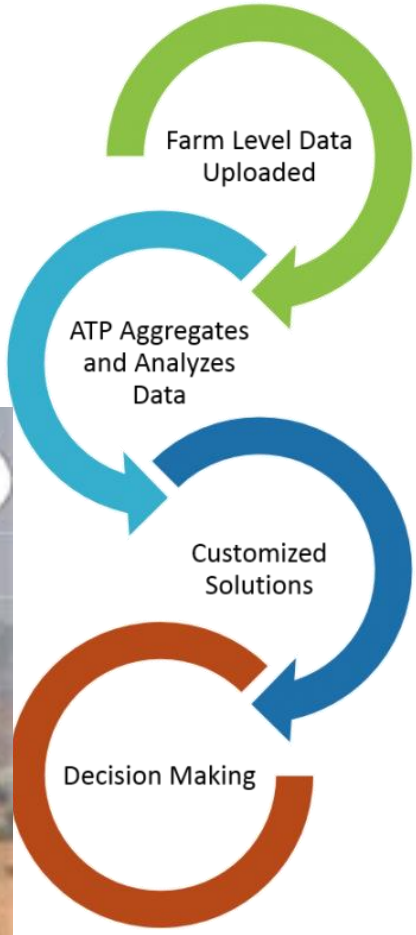


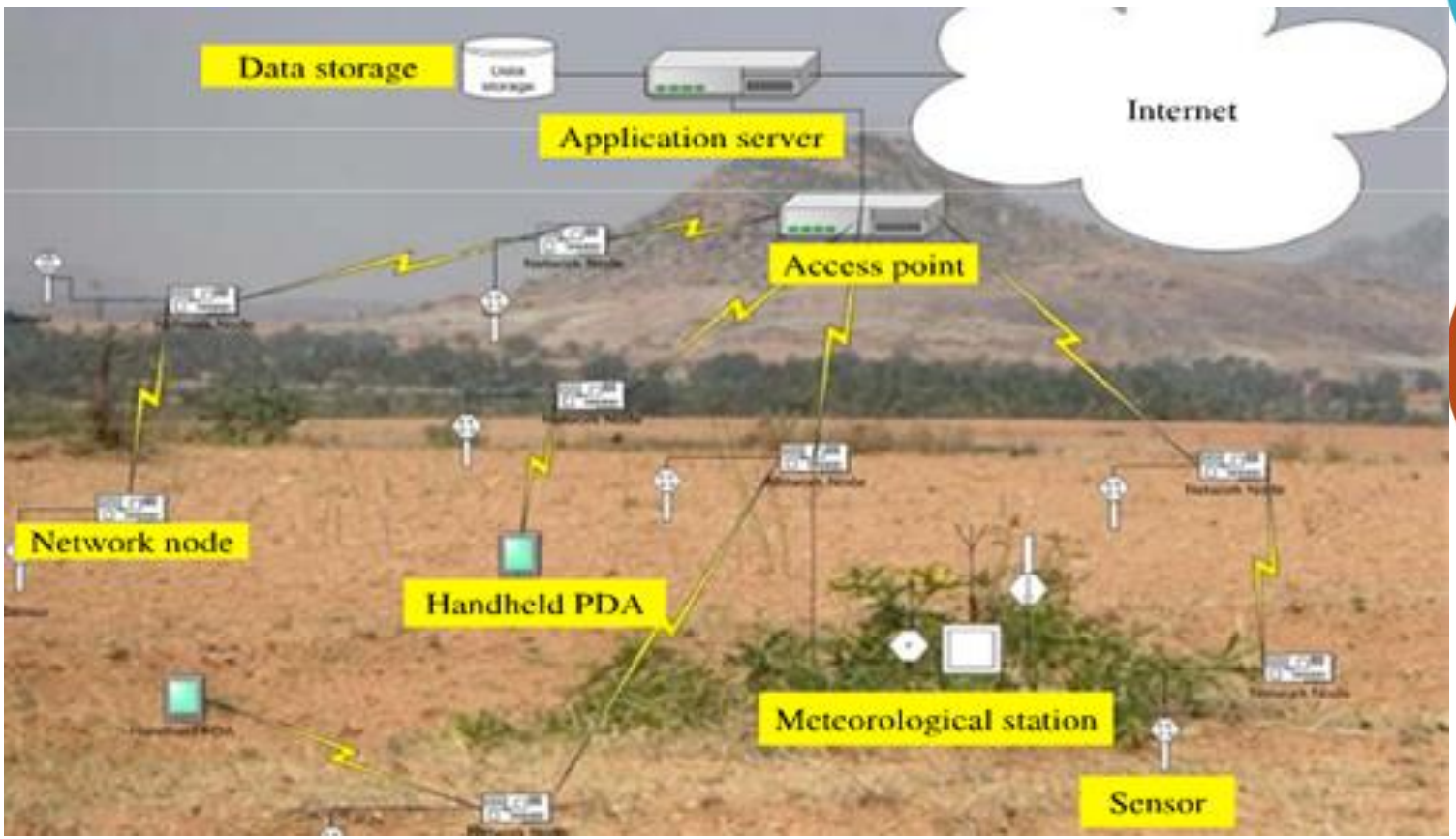
RS ANN Reg

ANN derived soil moisture (Θ) and estimated ETa using RS data (Ambast, 2001)

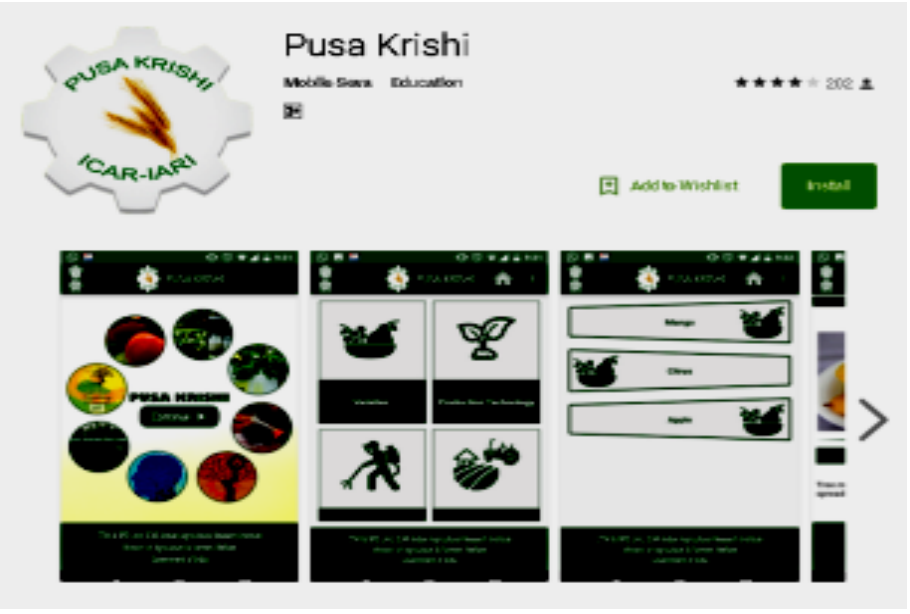
Big Data Analytics in Agriculture



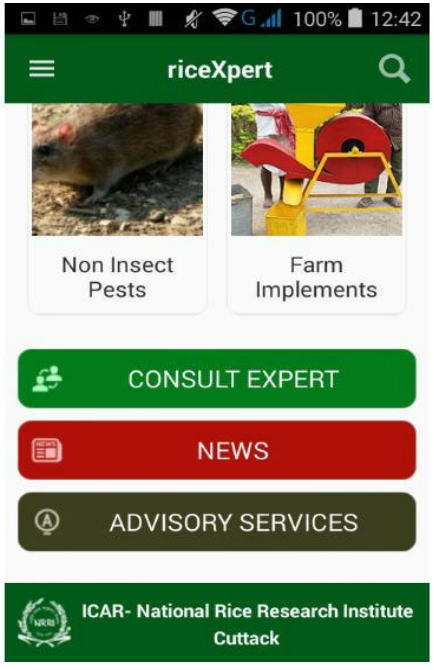




Digital Farming



Share of Rural India in Smart Phone Mobile Users: 48% by 2020



Fusion of Technologies

- Big Data Analytics
- IoT in Farming
- GIS and Remote Sensing
- Image Processing
- Digital Farming
- Artificial Intelligence
- Deep/Machine Learning
- Blockchain technology
- Sensors & Robotics
- Agri-Voltaics
- CRISPR- Cas9, Cas12A, CasX

Secondary Agriculture: Food Processing & Further…

Food lost or wasted globally, annually	1.3 billion tonnes

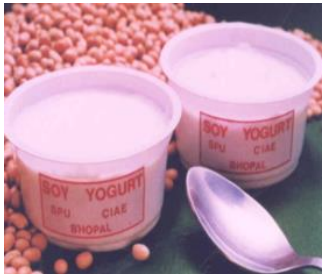
Post-Harvest Loss Estimates in India
(including on-farm & handling losses)

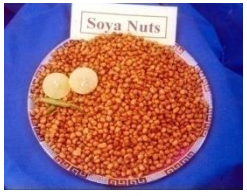
Post Harvest Losses
Rs. 95,000 crores every year
(up to 18%)

CROP	% Loss, Minimum	% Loss, Maximum
Cereals	3.9 (Sorghum)	6.0 (Wheat)
Pulses	4.3 (Chickpea)	6.1 (Blackgram)
Oilseeds	2.8 (Cotton seed)	10.1 (Groundnut)
Fruits	5.8 (Sapota)	18.0 (Guava)
Vegetables	6.8 (Cabbage)	12.5 (Tomato)
Spices, Condiments & Plantation Crops	3.9 (Black Pepper)	7.4 (Turmeric)
Livestock Produce	0.8 (Milk)	6.9 (Inland Fish)

Primary to Secondary Agriculture

ऊँटनी के दूध के विभिन्न उत्पाद
CAMEL MILK PRODUCTS





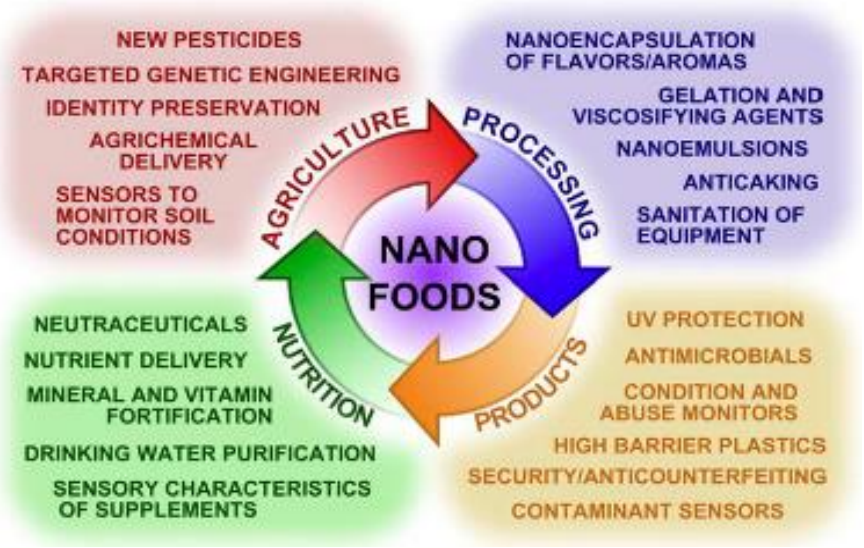
Indian Health Food Industry

- Functional foods seen as an effective measure to arrest the growing nutritional deficiency problems
- Health and wellness foods estimated at 10000 crores in 2012 and expected to grow to 55000 crores by 2015 at CAGR of 33%

Functional Foods:

- Functional Dairy Foods
- Milk fat is essential for healthy life
  - Nutrition
  - Sensory satisfaction
  - Fortification
  - Modulation of physiological systems

Concept of Nanofoods



PROBIOTICS: A Healthy Choice in Dairy Foods

Biofortification and Zero Hunger Challenge

CALORIE DEPRIVATION

PROTEIN DEFICIENCY

MICRONUTRIENT DEFICIENCY

3 Major Approaches

1. Naturally occurring biofortified plants like moringa, sweet potato, nutri-millets and fruits and vegetables.
2. Biofortified varieties selected by breeding and selection, e.g., iron rich pearl millet and zinc rich rice
3. Genetically biofortified crops like Golden Rice and iron rich rice (after appropriate regulatory clearance)

Three major dimensions of hunger

Grain Processing Sector

- Establishment of Rural Agro-Processing Centers in Production Catchments: 16 APCs in Rural Areas created
- Value Addition to many Agricultural and Horticultural Crops

Successful Value Addition Technologies

Category	
Food based	32
Machinery based	10

Rural Agro-Processing Centre

Millet Milling Pilot Plant

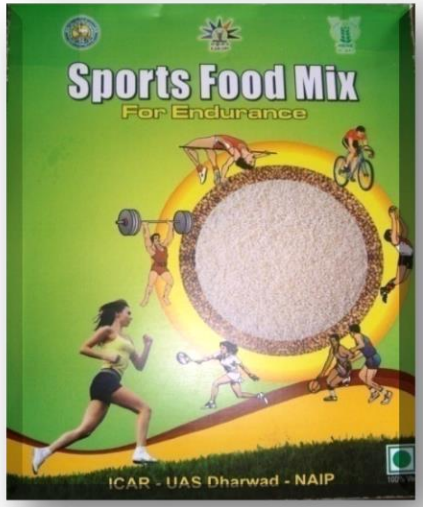
	Dehusking and shelling of maize cobs in single pass
Capacity	750 - 800 kg cobs/h
Units sold	20
Monetary benefit	US $ 46,000/annum
Loss reduction	2 %
Benefits	US $ 17,455/annum

Maize Dehusker-cum-Sheller

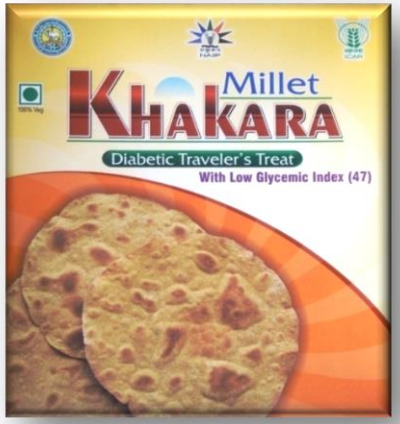
- Used for dehusking and shelling of maize cob simultaneously in singe pass
- Utility for growers and seed industries
- Capacity: 800 cobs/h
- Power: 5 hp motor
- Units sold: 14

Millets revived in Indian food through acceptable products

Little Millet Cookies

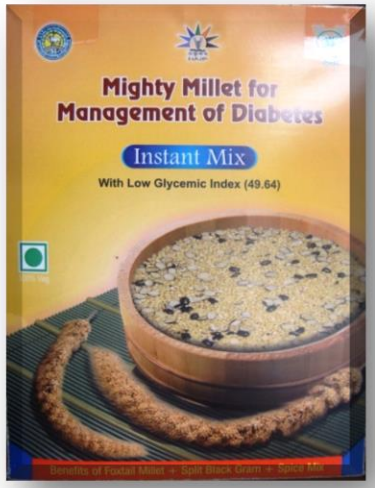


Little Millet based Sports Food Mix



Foxtail Millet *Khakhra*

Little Millet Flakes



Foxtail Millet Diabetic Mix

Agro-techniques for production of French fry grade potatoes

- Advanced hybrid MP/98-71, Kufri Frysona (India's first specialized variety for French fries)
- Big and uniform size
- Low sugar content
- High dry matter

- Expected increase in area, production and net income: Production cost of French fry grade potato, US $ 1490 per ha and gross return, US $ 5090.
- Can realize US $ 3,600 per ha of net return by adopting these techniques 20- 60% higher.

Coconut Sweet Chips

A selection from Maharashtra suitable for chips: add value and income

Raw Material: Coconut

Volume Produced: 300 kg

Cost of Production: US $ 3/kg

Selling Price : US $ 3.8/kg

Investment Made: US $ 8,180

Potential: 5 t/annum

India, producing 13 billion nuts per annum, is one of the market leaders among 90 countries

Besides, these industries have been producing Coconut Virgin oil, pickle, Coconut Water Squash, Coconut chutney: Providing employment to 400 man-days each to 15 SHGs

Wine & Ethanol

Wine from Jamun, Karonda and Pomegrenate (8-12%)

Litchi Wine
Production: 450,000 t
Yield: 11.5%

Sorghum
Ethanol: 1100 l /ha

Value Added Products of Jasmine



Garlands

Hair adornment products



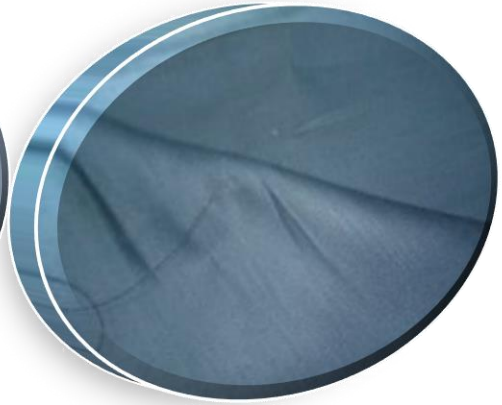


Dry Flower Products Exports





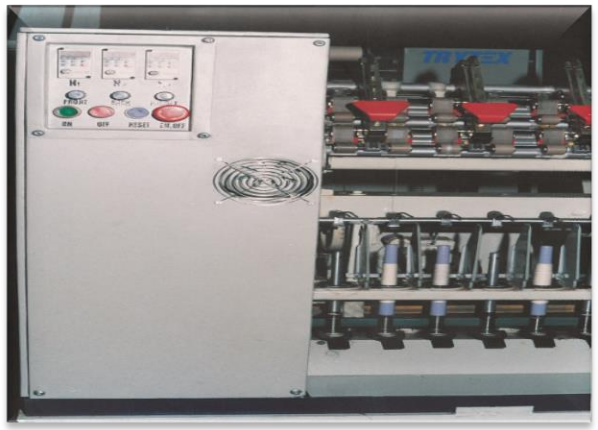
Banana fibre as fabric



Cotton

Village level ring frame

Micro processor based ring frame for yarn making in rural areas



Axial flow cotton pre-cleaner

Axial flow pre-cleaner for seed cotton for use in the production catchment

Industrial Scale Jute Yarn

Geonet from Coconut Fibre for Soil Stabilization

Eco-holi and textile colours from vegetable sources

Surface Painting of idols

Low cost & safe eco-holi powders

1,264 shades of Natural Dyes for Textiles from 10 sources

Willow -leaved Sea Buckthorn (*Hippophae salicifolia*)

- J&K, Himachal Pradesh, Uttarakhand and Sikkim
- Fix atmospheric nitrogen through symbiotic association with *Frankia*
- Sharp lemon flavour, 60-80& juice rich in sugar, organic acid, amino acid, tannins and vitamins
- Rich in Vitamin- A & E, carotenes and other tocopherols and flavonoids
- Vitamin C (100-300mg/1000g fruit)
- Leaves and fruits have high nutritional and medicinal value
- Anti-inflammatory, antimicrobial, pain killer and a promoter in tissue regeneration and cosmetic preparation; cardivascular health
- <u>Products -</u> Tea from leaves, beverages, jams from fruits, fermented product from pulp and animal feed from leaves, pulp and seeds

Tibetan Sea Buckthorn
(*Hippophae tibetana*)

Common Morel, Morel Mushroom, Sponge Morel (*Morchella esculenta*)

- J&K, Himachal Pradesh, Uttarakhand
- Best of the edible fungi, sought-after, commercially harvested in North America and elsewhere
- Quiet nutritious fruiting bodies, rich in protein and mineral and low in calories
- ***Medicinal-*** Anti-tumor effects, immune-regulatory properties, fatigue resistance,anti-viral effects
- High demand in local markets of HP (Mandi & Kullu)
- Price- 12,000-14000/kg

Focus on Edible Bamboos

Edible Insects
- A New Resource

Agave worm

Honeypot ants

Leafcutter ants

Lemon ants

Bamboo worm

Bee

Cicada

Mealworm

Edible Sea weeds

- Arame (*Eisenia bicyclis*)
- Badderlocks *(Alaria esculenta*)
- Bladderwrack (*Fucus vesiculosus*)
- Caroler (*Callophyllis*)
- Carrageen moss
- Channelled wrack (*Pelvetia canaliculata*)
- *Gracilaria edulis*
- Gellidiella (*Gelidiella acerosa*)
- Chorella(*Chlorella* sp)
- Dulse(*Palmaria palmata*)
- *Ecklonia cava*
- Gutweed (*Enteromorpha intestinalis*)







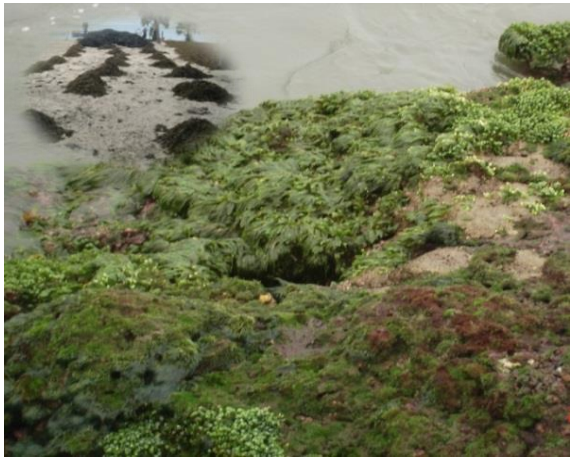





Seaweeds: Fodder, Nutraceuticals & Biofertilizer

Integrated Multi-trophic Aquaculture

- "Sargavit" - Sargassum Liquid Extract
- "Cadalfert" - Mulch Power



Mulch powder

Fertilizer & Fodder

Sargassum mulch and liquid spray on Okra: 50% increase in fruiting

Up to 20% in cattle ration

Cadalmin™ ADe

Agarose from seaweeds

Aquatic Nutraceuticals

Collagen Peptide From Fish Scale

Fish scale →

↓

Tissue softening →

↓

Collagen hydrolysis

↙ ↘

Hydroxyapatite Product released

Collagen peptide

Cadalmin™ Green Algal extract and Green Mussel extract as anti-arthritics

Seaweed-based: Nutraceutical drink; anit-diabetic & hyperthyroid extracts; sausages

Wealth from Waste

Kitchen and agro-waste to compost

Wastewater 4 Agriculture

Chitin & Chitosan from crustacean waste

Collagen Chitosan membrane from fishery waste

Biofertilizers from fish waste

Eco-brick; Feed Block, Bio briquettes

Grouping 4 Growth

- FPOs: 10 + 25
- Appreciation for group formation in different ways: Inputs, Labour, Farm mechanisation, Value addition, Marketing
- Aggregation at both inputs and produce
- Capacity building for skillsets for registration, records for GST, etc.
- Grading of commodities and quality classification for remunerative prices
- Higher financial support particularly for working capital
- Shareholder benefits: Input cost reduction v/s annual dividends
- Digitalisation: Blockchain based real time monitoring

Farmer Organisations:
SHGs, FIG/CIGs, FPOs/FPCs, Start UPs

Focus

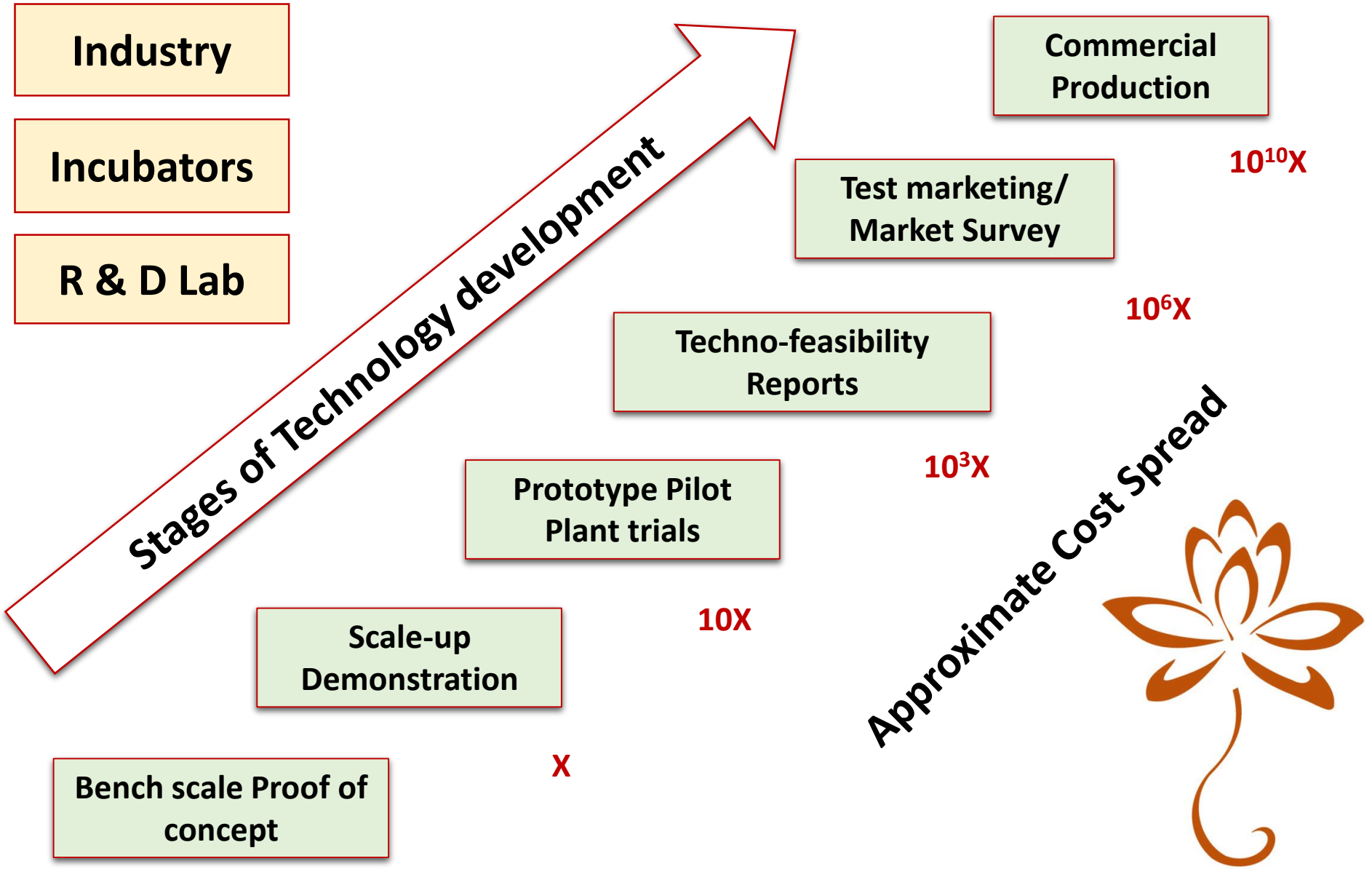
- Health & Employment
- Youth & Women
- Enhance Efficiency & Reduce Costs
- Water & Energy
- Diversify & Enhance Income
- Process & Prosper

Agri-Tech Inclusion

- Contemporary IoT Technologies for Sustainable Farming
- Precision Farming: Future of Agriculture
- Connected Farm Systems: End-to-End Assisted Farming
- Online Connected Market Place: Market-2-Farm & Farm-2-Market
- Advanced in Agri-Mechanisation & Labour Productivity

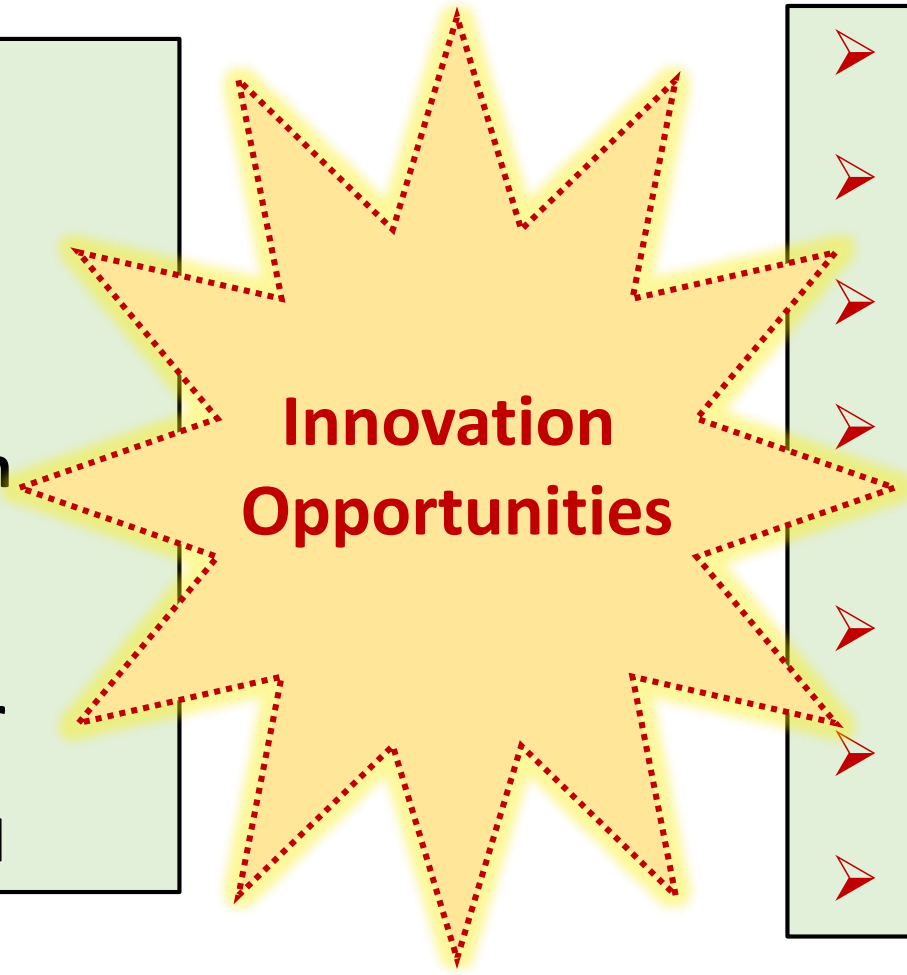
Highly fragmented, Unorganised: Linkages, Convergence

Technology Partnerships Framework



Innovation

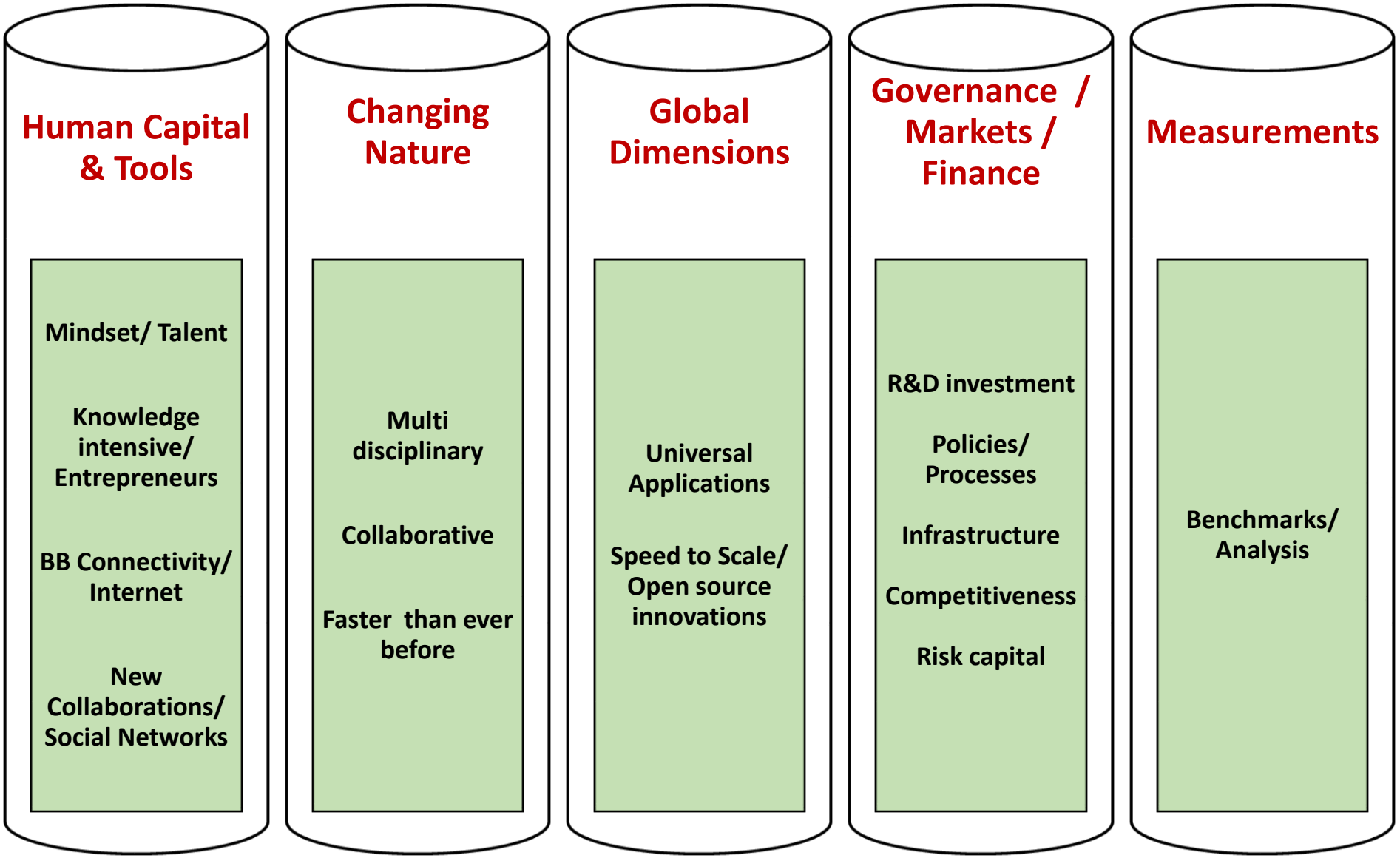
- Products
- Services
- Processes
- Organization
- Governance
- Social sector
- Urban/Rural



- Public
- National
- International
- Private Sector/ NGO
- Individual
- Institution
- Big/Small

Innovations redefine everything

Innovation Pillars



Agri-Business System

- **Input Subsystem:** seeds, feed, fertilizer, agrochemicals, machinery - manufactured, imported or distributed

- **Production Subsystem:** food grains, horticultural produce, dairy, poultry, fishery

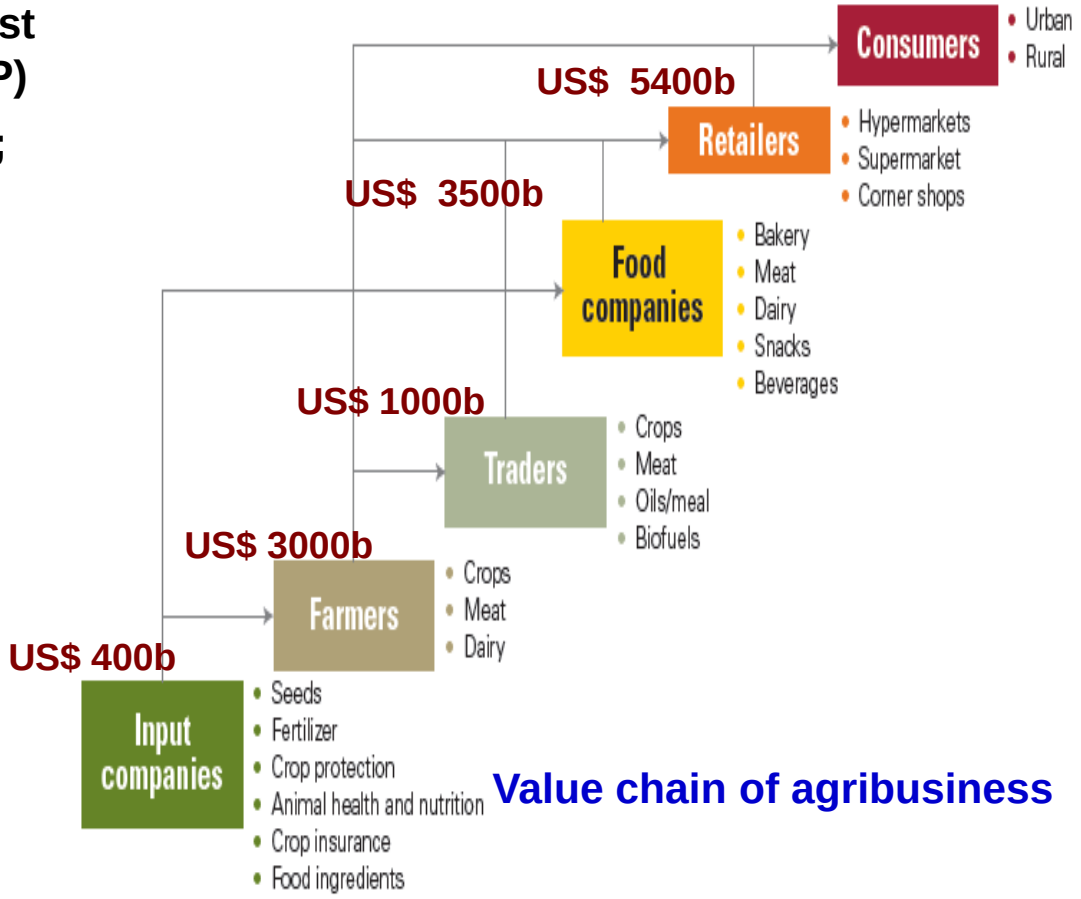
- **Processing Subsystem:** transforming the output of production subsystem with different degree of processing

- **Marketing Subsystem:** transferring of goods from one subsystem to another - Logistics, Retailing, wholesaling

- **Support Subsystem:** government agencies, commercial associations, credit and financing institutions, research organizations and co-operatives

Nature and Scope of Agri-Business

- **Size:**
  - **Global: US$ 20 trillion in 2012; largest business sector; (30% of global GDP)**
  - **India: US $ 350 billion (20% of GDP); growing rapidly**
- **Diversity :**
  - **Variety of players: input companies, farmers, traders, food companies, retailers, service providers and regulatory institutions**
  - **Range of players at each link**
- **Volatility**
- **Significance:**
  - **critical for inclusive growth**
  - **enables sustainable development**
  - **promotes innovation**
  - **creates shared value**
- **potential to address national and global challenges: food, healthcare, environment, energy**



Value chain of agribusiness

Fig adapted from: KPMG (2013)

Components of Agri-Business

Agri & Food Inputs

- ✓Seeds
- ✓Fertilizers
- ✓Agro-chemicals
- ✓Agri-biotech
- ✓Irrigation
- ✓Farm Machinery
- ✓Poultry Feed & Equipment
- ✓Dairy Feed & Equip
- ✓Aqua & Fishery Feed & Equipment
- ✓Food Packaging

Prodn. and Ware-housing

- ✓Food Corporation of India
- ✓State Warehousing Corporation
- ✓Central Warehousing Corporation
- ✓Pvt. Warehouses
- ✓Cold Storages
- ✓Floriculture
- ✓Greenhouses

Logistics & Distrbn.

- ✓Ports
- ✓Reefer Transport
- ✓Caterers

Trading

- ✓Edible Oil
- ✓Grain
- ✓Spices
- ✓Fruits & Veg
- ✓Meat/ aqua
- ✓Commodity Exchanges

Processing

Primary Process

- ✓Grain Milling
- ✓Edible Oil
- ✓Dairy
- ✓Fruits & Veg
- ✓Sugar

High Value Processing

- ✓Confectionery
- ✓Bakery
- ✓Beverages
- ✓Dairy
- ✓Meat & Poultry
- ✓Marine & Fishery

Food Retail & Food Service

- ✓Super Markets
- ✓Hyper Markets
- ✓Fast Food & Beverage Chains

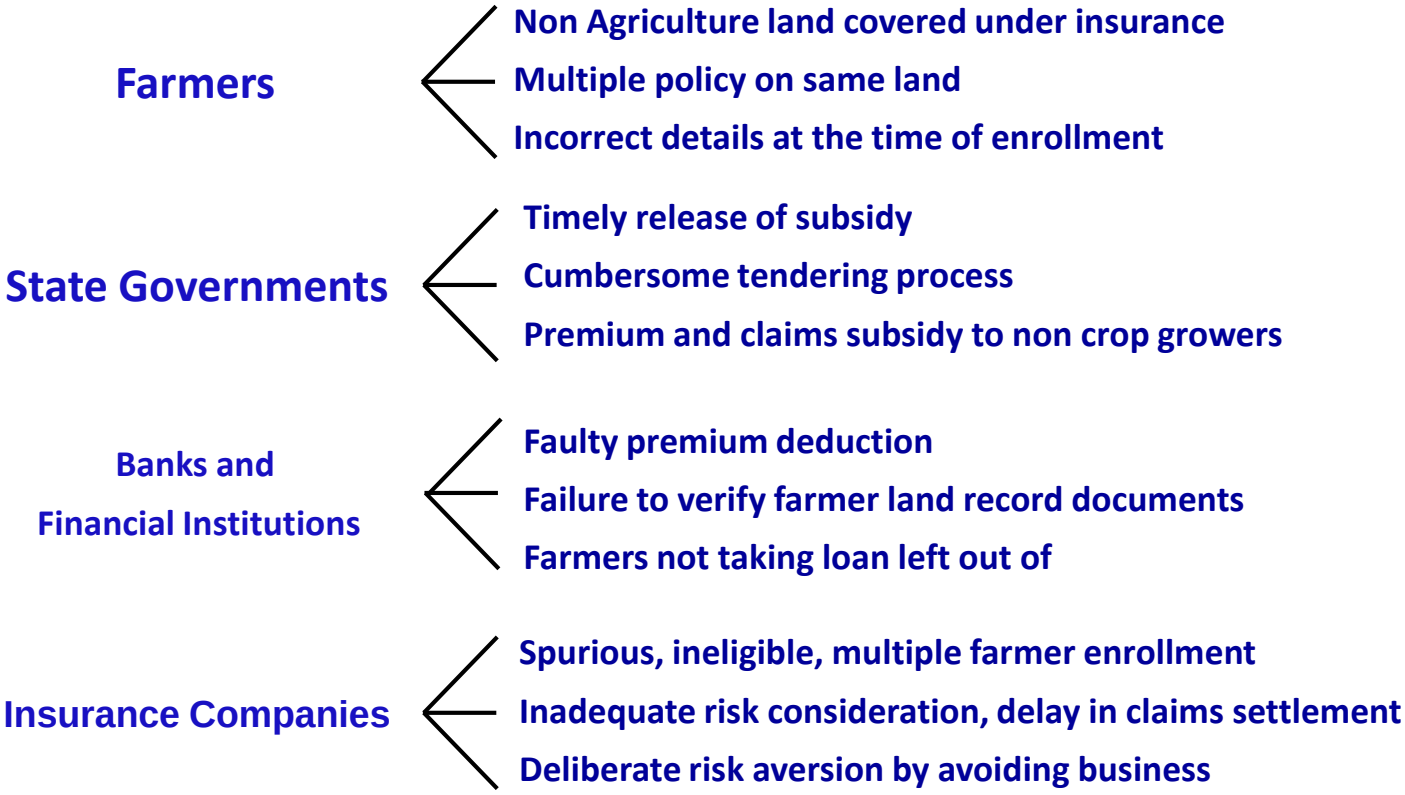
Source: Yes Bank

Transforming Farmers into Agripreneurs

- Sensitization
- Training & Capacity Building
- Legal & Commercial Handholding

F-INNOVATIONS

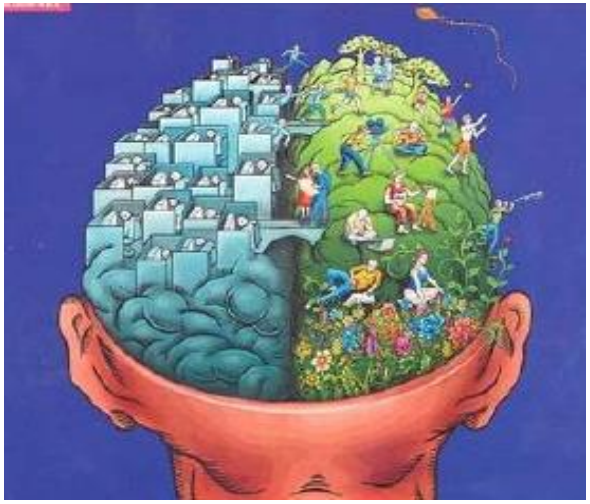
Challenges of Stakeholders



Disruptive Models; Digital Transformation

National IPR Policy; May, 2016

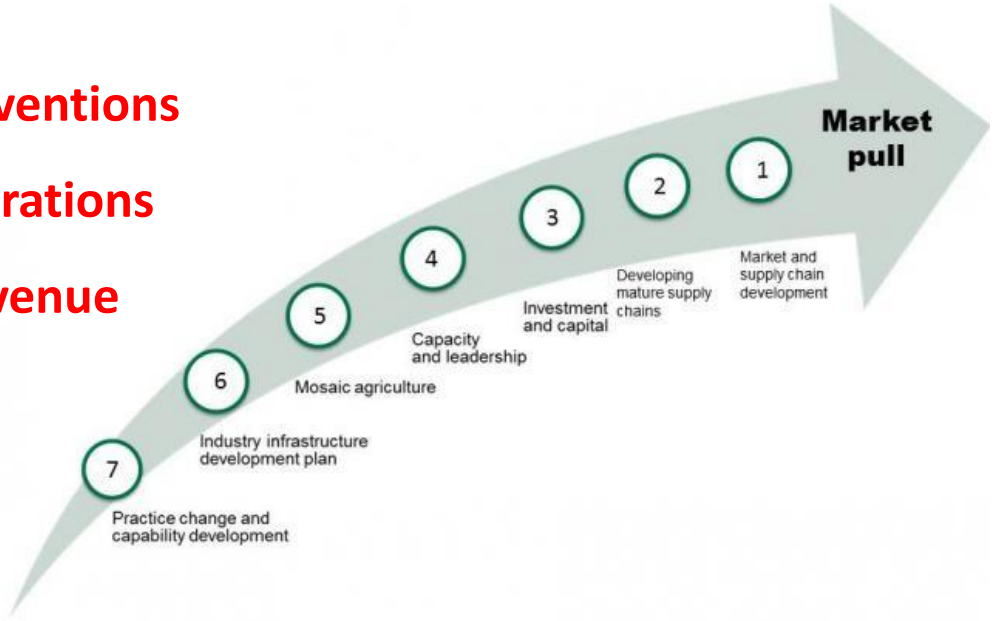
- IPR Awareness, Outreach & Promotion
- Generation of IPRs
- Legal & Legislative Framework
- Administration & Management
- Commercialisation of IPRs
- Enforcement & Adjudication
- Human Capital Development



ABIs & Agri Start Ups

Transformational Agriculture: Go 'Beyond Farms', for Smart Farming

- Disruptive
- Smart Interventions
- Ease of Operations
- Enhance revenue



- Novelty
- Quality
- Innovation
- Entrepreneurship

A new hope for Indian Farming:

From DISTRESS to DESTRESS

New Generation Agri-Incubators (~100)

- Leveraging and aggregating programs and services
- Promote agribusinesses
- Enhancing partnerships through entrepreneurship development, innovation and value addition
- Open up opportunities for farmers to take their products and technologies to a global market

- NAARM, Hyderabad
- ICRISAT, Hyderabad
- MANAGE, Hyderabad
- BEC STEP, Bagalkot
- IISR, Kozhikode
- CIFT, Cochin

- BIONEST, Cochin
- Sathyabhama University TBI, Chennai
- TNAU, Madurai TBI, Madurai
- CIFA, Bhubaneswar
- REC-NIT, Kozhikode
- CIBA, Chennai

- CIRCOT ABI Centre, Mumbai
- IVRI, Izatnagar
- NRC Pig, Guwahati
- IARI, New Delhi
- ABI CIPHET, Punjab
- Nutrihub, IIMR, Hyderabad
- CIAE. Bhopal

- NRRI-ABI, Cuttack
- CARI, Izatnagar
- TBI University of Hyderabad
- NRCM, Hyderabad
- CIFE, Mumbai
- Dayalbag Educational Institute, Agra

Incubator Support Systems

Technology, Scientific, Legal & Business support

Mentoring & Networking

Client consultation

Sharing facilities & infrastructure

IP Services & Funding Sources

Assistance in packing, labeling & branding

Business plan development

Skill & Capacity development

Market Linkage

Handholding small & medium enterprise to develop business

Product development & Test marketing of product

Employment generation

Desired Support Systems

Access to seed funding for agri-incubators

Single platform for discussion

IP, marketing, technical, Patenting and legal

Wider publicity

Networks with other incubators

CSR awareness and opportunity to invest in TBI

Possibility to avail grant money

Support to address startups queries & marketing linkage

Fund, Infrastructure and instruments availability

Policies and guidelines of standard operating protocols need to be put on use

Expertise for Business Plan Development

Tie up with existing industries

Networking with industry experts

Agri-Tech Global Investments

Agritech Global Investment (U$ 3.23bn)

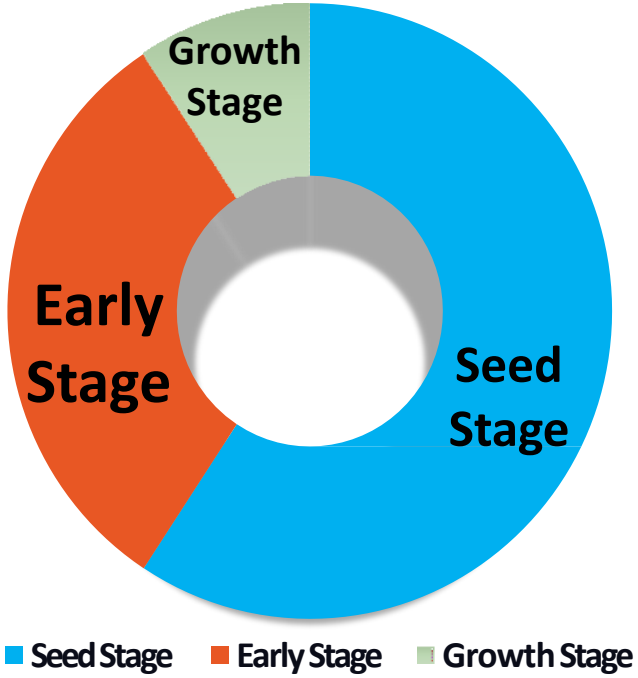
Major global Agritech categories

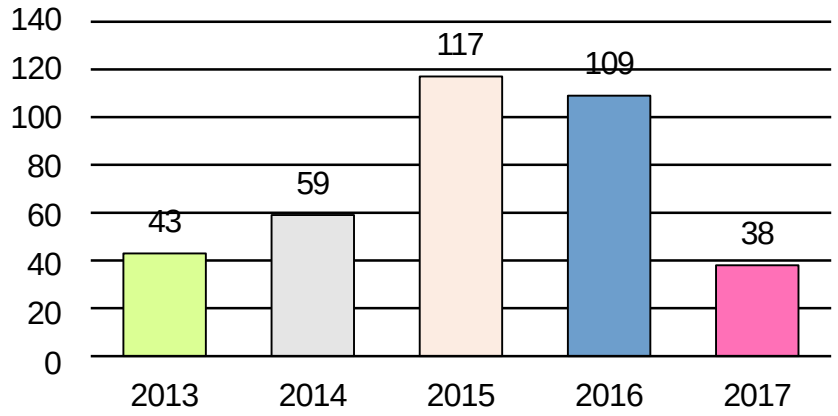
- ❖ Ag. Biotechnology
- ❖ Online farm-2-consumer
- ❖ Farm management software
- ❖ Sensing & IoT, robotics
- ❖ Mechanization equipment
- ❖ Novel farming systems
- ❖ Food safety & traceability

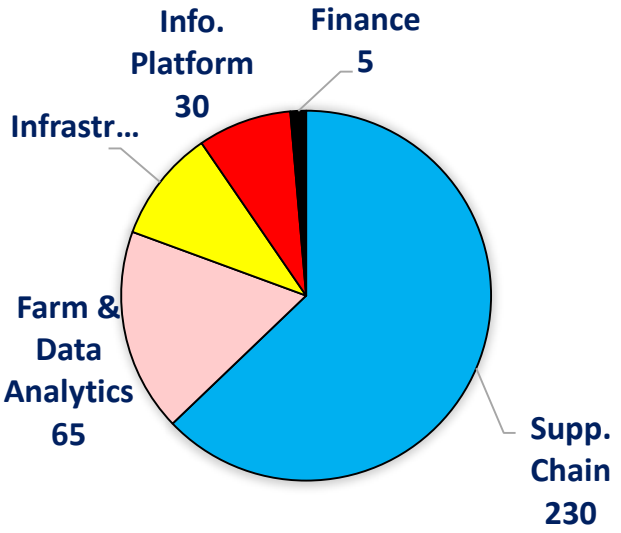
Agritech India Investment (U$ 313 mn)

- ❖ 53 Indian start-ups raised $313mn
- ❖ Major categories in Indian Agritech sector:
  - Supply Chain (like e-distributor, marketplace)
  - Farm data & analytics
  - Farm infrastructure (like hydroponics)

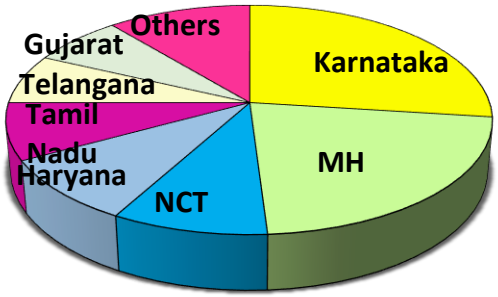
Number of Start-ups (2013-2017)



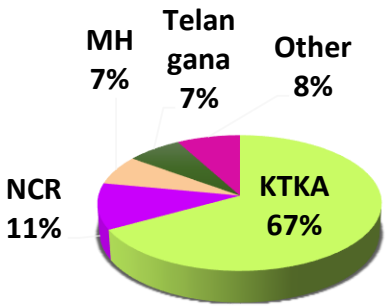




Key Indian states focusing on Agritech Start-ups (2013-2017)



Funding (2013-2017)



Domains of Agri-Start Ups in India

Focus Areas

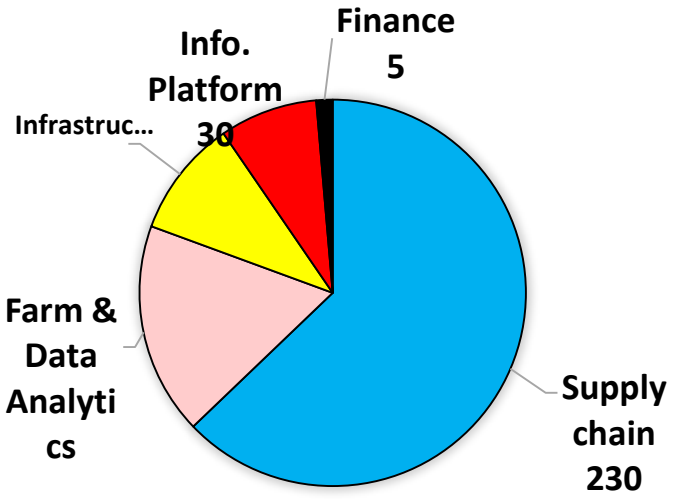
- Big Data analytics
- Farming as a service
- Market linkage models and IoT

High Agri-tech

Agricultural value chains from weather prediction and sowing advisories to farm output through web portal

Deals & Funding

- Raised Rs 1,600 crore in 2016
- Funding deals in 2017-18 focused on IoT and market linkage platforms



Start-ups and Investors

- 225+ new Agritechstart-ups incorporated between 2015 and 2016
- Annual investments have gone up 25 times demonstrating investor focus on mature Agritech start ups

Issues & Challenges

- Low landholdings
- Long gestation period
- Tech affordability
- Skill adaptatibility
- Return for investors

Supporting Incubators

- Government and academia nurturing in the form of incubators: mentoring, incentives , event participation opportunities, etc.

Source: NASSCOM, 2018

Major Firms into Agri-Tech

TATA CONSULTANCY SERVICES

- TCS → Mobile delivery based advisory platform →. mKrishi. (Information system for farmers - access localised information and advice on agricultural issues)
- Easy tool to seafood growers in stocking, pond management, feed and water test management and sampling in addition to providing weather forecast and graphical records.

Tech Mahindra

- Tech Mahindra enables companies to transport produce and meat grown at farm and deliver it as fresh.
  - Solution enables real time alerts/notifications on threshold violations
  - Monitor storage temperature and humidity levels (food quality)
  - Comply to food safety regulations

Infosys

- Connecting the dots between on- field data and business insights of the farming ecosystem to transform operations across the agriculture lifecycle.
- Infosys mobility solutions integrate geospatial imagery & data for smart agriculture, livestock management and logistics.
- It also offers precision farming solutions for site-specific crop management.

Cognizant

- Cognizant helped AQUATEK (brand of Monsanto Corporation) to improve there product.
- Cognizant prepared an intuitive interface that can be viewed across a wide range of devices. The solution involved satellite-linked, soil moisture probes to monitor water usage and crop health maps to monitor possible risks to crop health.
- Cognizant and AQUATEK have brought the labor- intensive business of agriculture into the digital fold

accenture

- Accenture offers various digital architecture services.
- Solution consists of generating vital insights for large farms.
- Improving the productivity and effectiveness of agro input company field agents.
- Accenture Connected Crop Solution connects the three stakeholders- field agent, agro input company and farmers.

ITC Enduring Value

- The e-Choupal is a unique web-based initiative of ITC Limited [a large multi business conglomerate in India]
- e-Choupal offer farmers required information, products and services they need to enhance farm productivity, improve farm-gate price realizations and cut transaction costs
- e-Choupal ensures world-class quality in delivering all these goods & services through several product / service specific partnerships.

Global priorities in Agri-tech

- Agricultural Bio Science
- Data Enabled Agriculture
- Automation & Robotics
- Supply Chain & Logistics
- Agri - Processing
- Specialized Autonomous Robot
- Crop Modelling Solution
- Farm Management Platform
- Smart Spraying
- Satellite Imagery
- Planting crops using robots
- Increased Usage of Drones

Indian Institutional Incentives

ASPIRE

NewGen IEDC
Innovation & Entrepreneurship Development Centre

NSTMIS
Department of Science & Technology
Government of India

AIM
ATAL INNOVATION MISSION

SFAC
लघु कृषक
कृषि व्यापार संघ

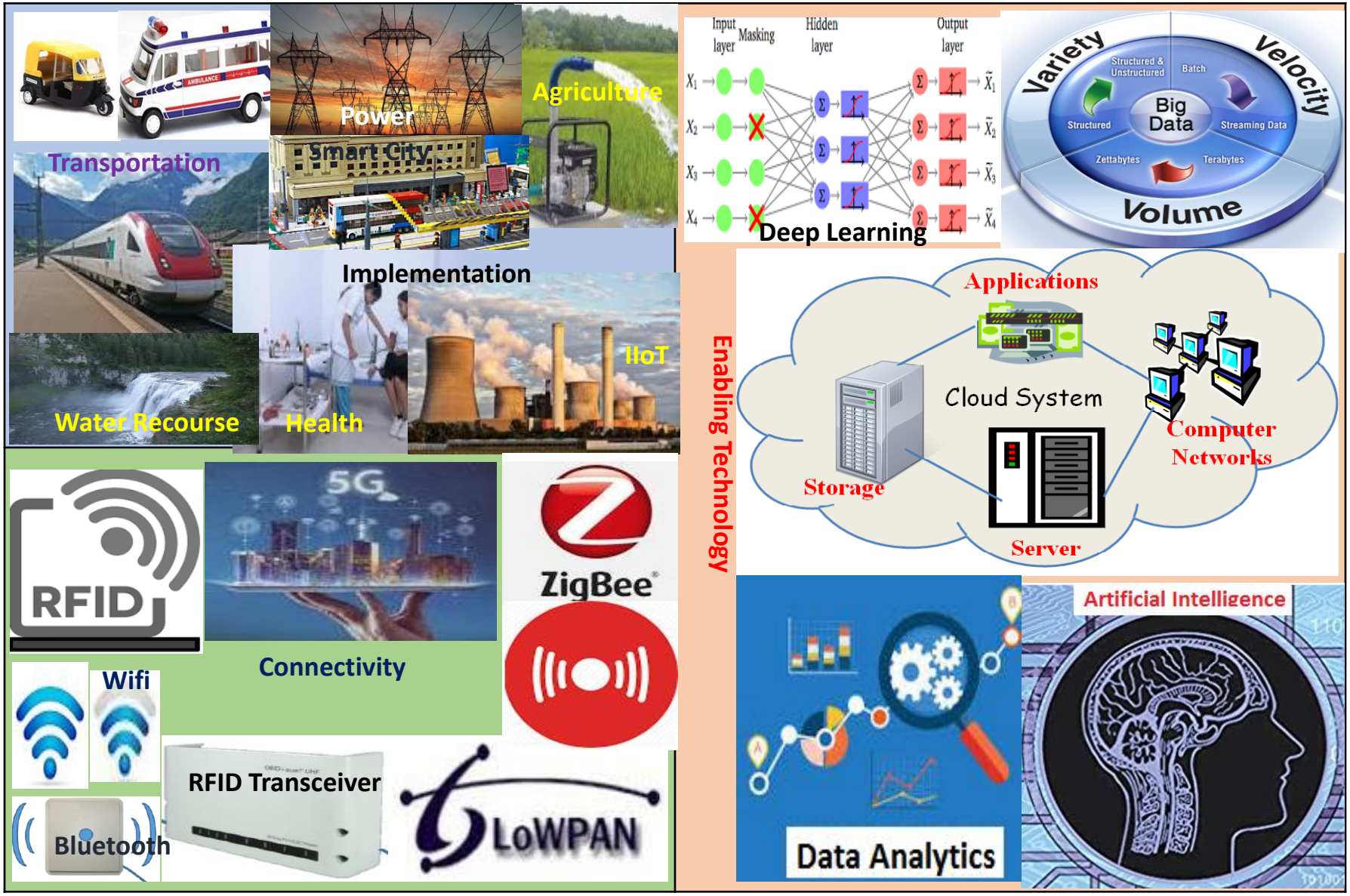
MSME
सूक्ष्म, लघु एवं मध्यम उद्यम
MICRO, SMALL & MEDIUM ENTERPRISES

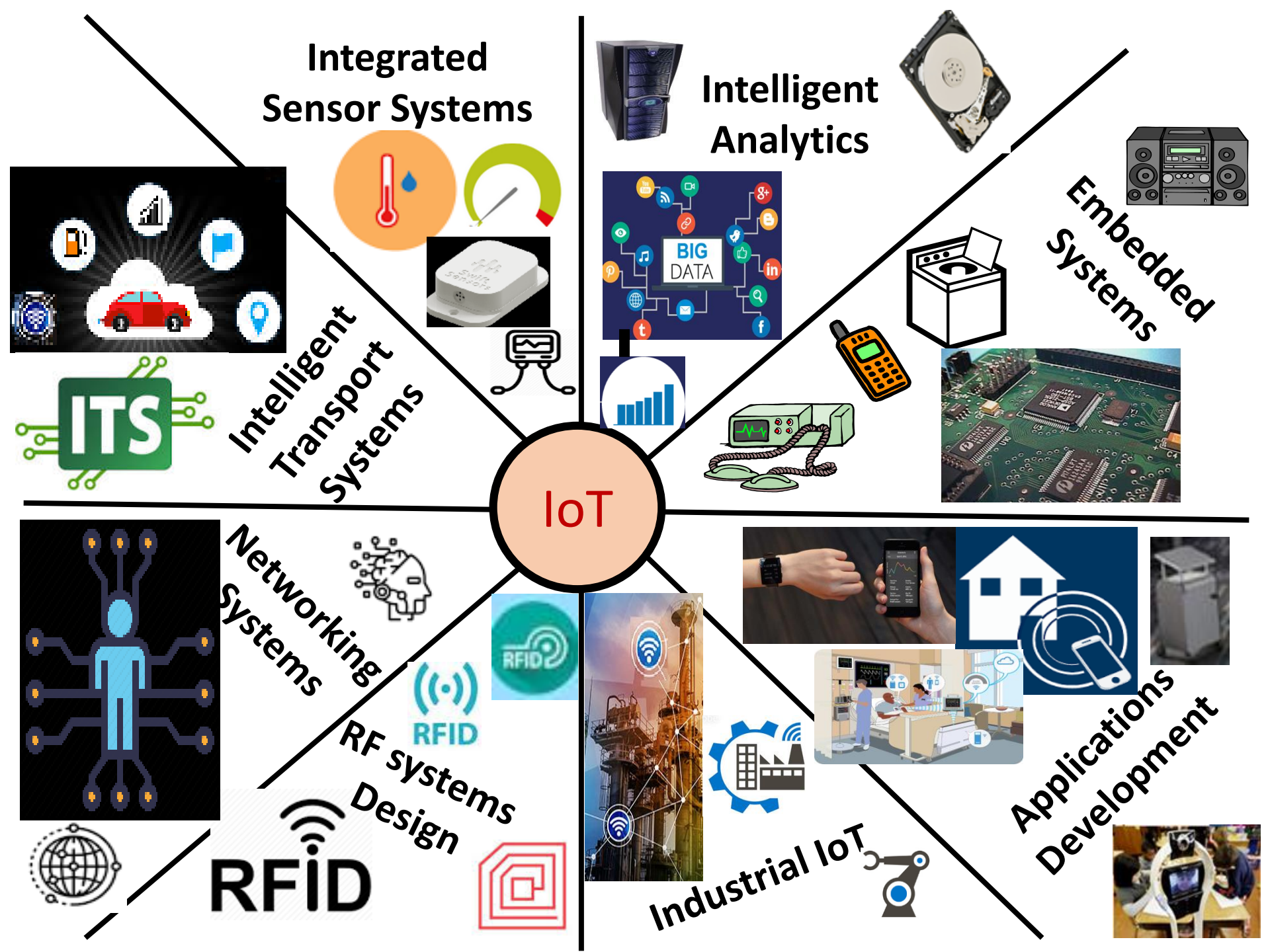
iNSERB DIA

NABARD

Geospatial Solutions

IoT Enablers




IoT
Integrated Sensor Systems
Intelligent Transport Systems
ITS
Intelligent Analytics
BIG DATA
Embedded Systems
Networking Systems
RFID
RF systems Design
RFID
Industrial IoT
Applications Development

farmzen

Kisan Raja

agricxlab
Transforming agricultural ecosystem

avanijal
Easy and Profitable Farming

Cropin

DISTINCT HORIZON

MiklensBio™
A New Hope

Fasal

SKYLARK DRONES

RUHM

microspin
seamless integration

JP

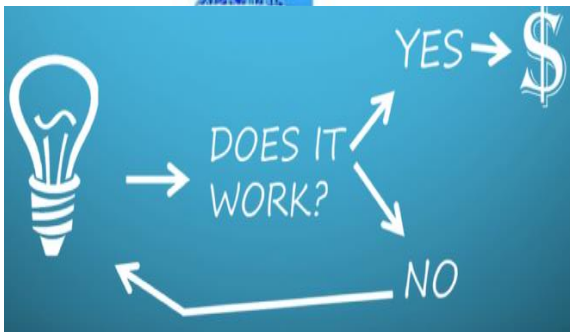
FarmERP

FutureFarms

PHYTOCOM
PHARMACEUTICALS (P) LTD
CLEAN EARTH & GREEN HEALTH

Digichorus
Discover and Communicate

"The action or process of setting something in motion"



100 + Agri Start Ups

Agri-Tech (51)

Aggregators (4)

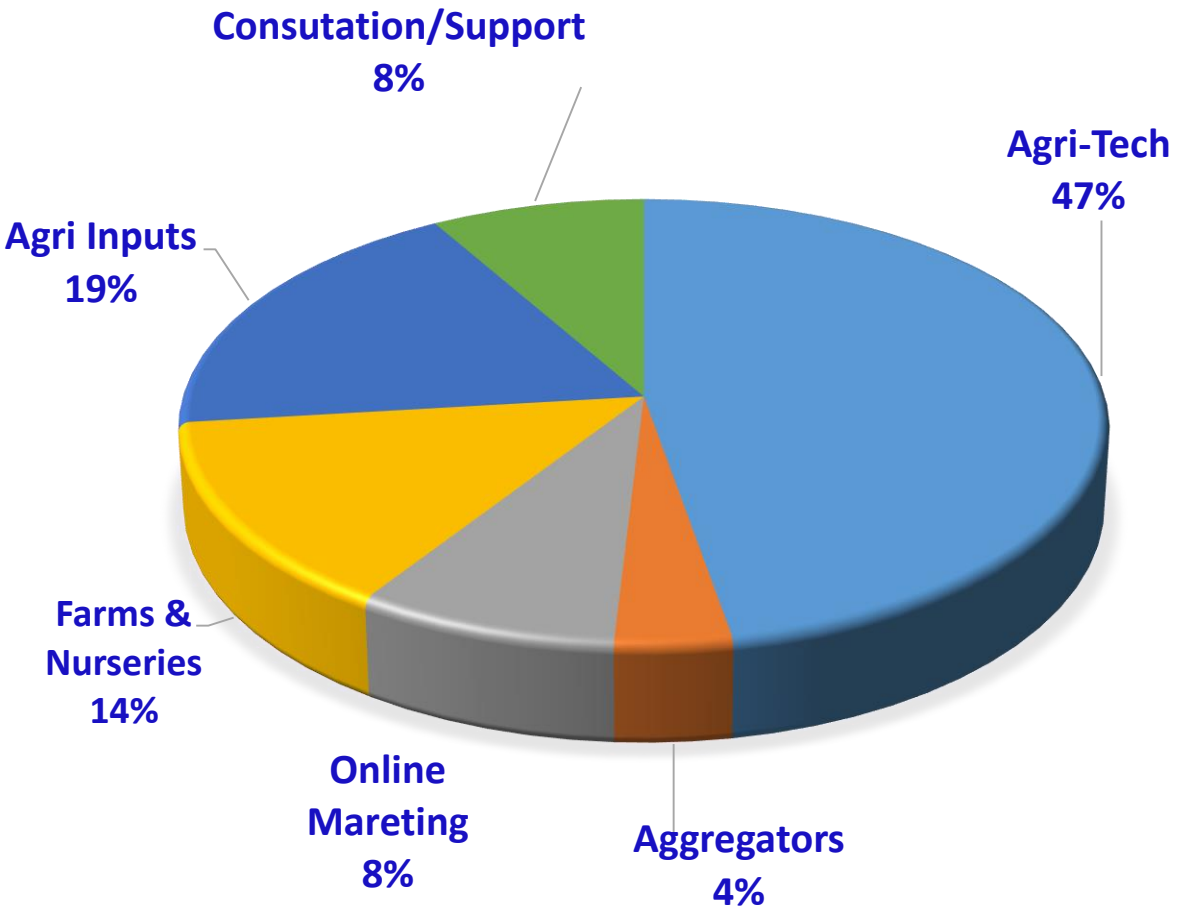
Online Marketing (9)

Farms & Nurseries (15)

Agri Inputs (20)

Consultation/ Support (9)

Categorisation of Agri-Start Ups



- Smart Soil Testing
- Disease forecasting & control
- Bio formulations
- Value Addition
- Machine Vision Technology
- Cold Storage
- Drones
- Sensors

Agri Tech

- Apps
- Contract Farming
- IoT
- Biotechnology
- Solar panel applications
- Machine Manufacturing
- Hydroponics
- Waste management

Aggregators → **B2B,B2G & B2C**

Online Marketing → **B2B, B2G & B2C**

Farms & Nurseries →

- ❖Organic Farms
- ❖Horticulture Farms
- ❖Rabbit Farms
- ❖Bee keeping
- ❖Fish Farms
- ❖Swine Farms
- ❖Mushroom cultivation
- ❖Goat Farms

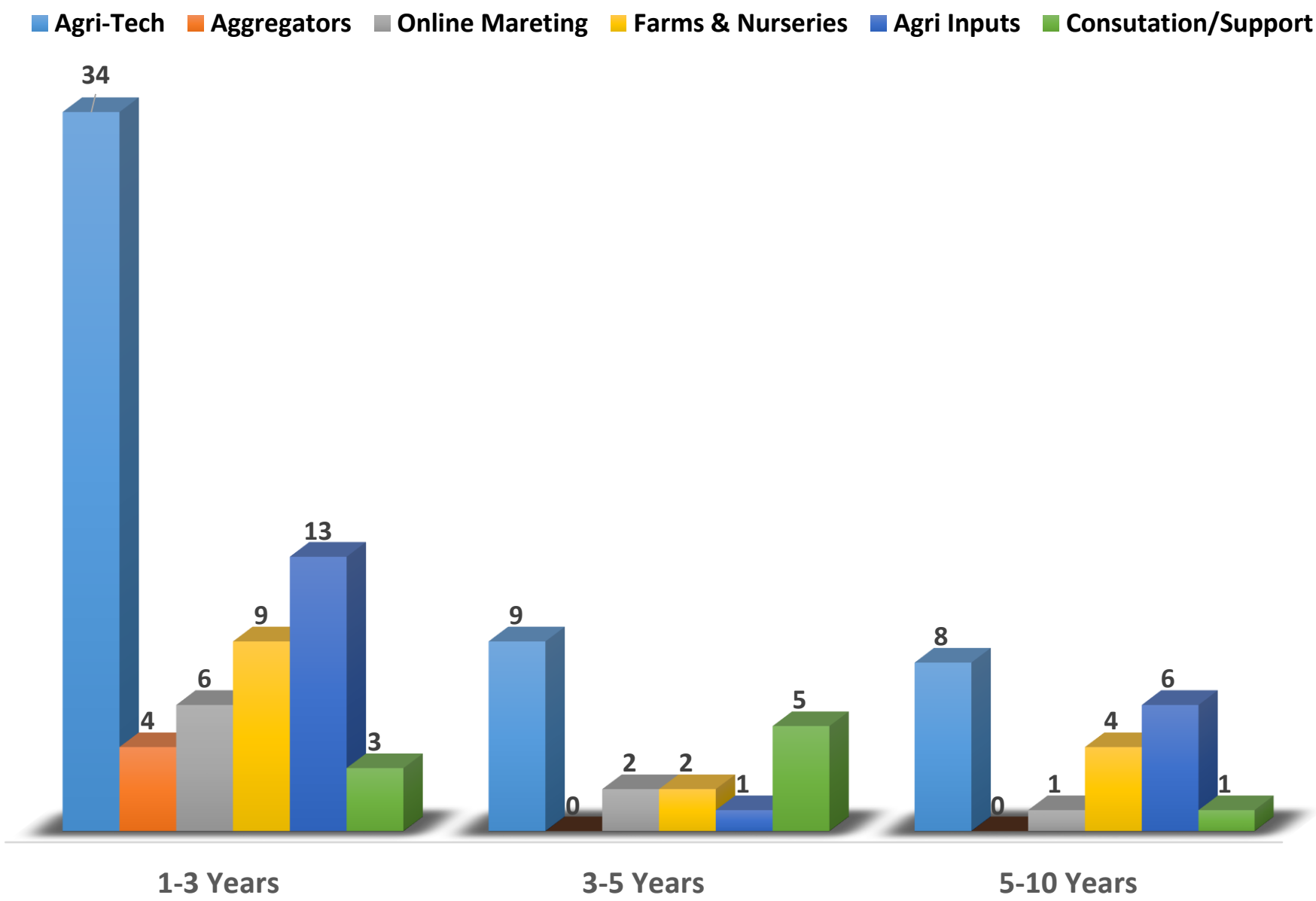
- Bio Inputs
- Organic manure
- Bio formulation
- Organic Bio Stimulants
- Organic / Herbal feeds
- Seeds
- Crop protection

Agri Inputs

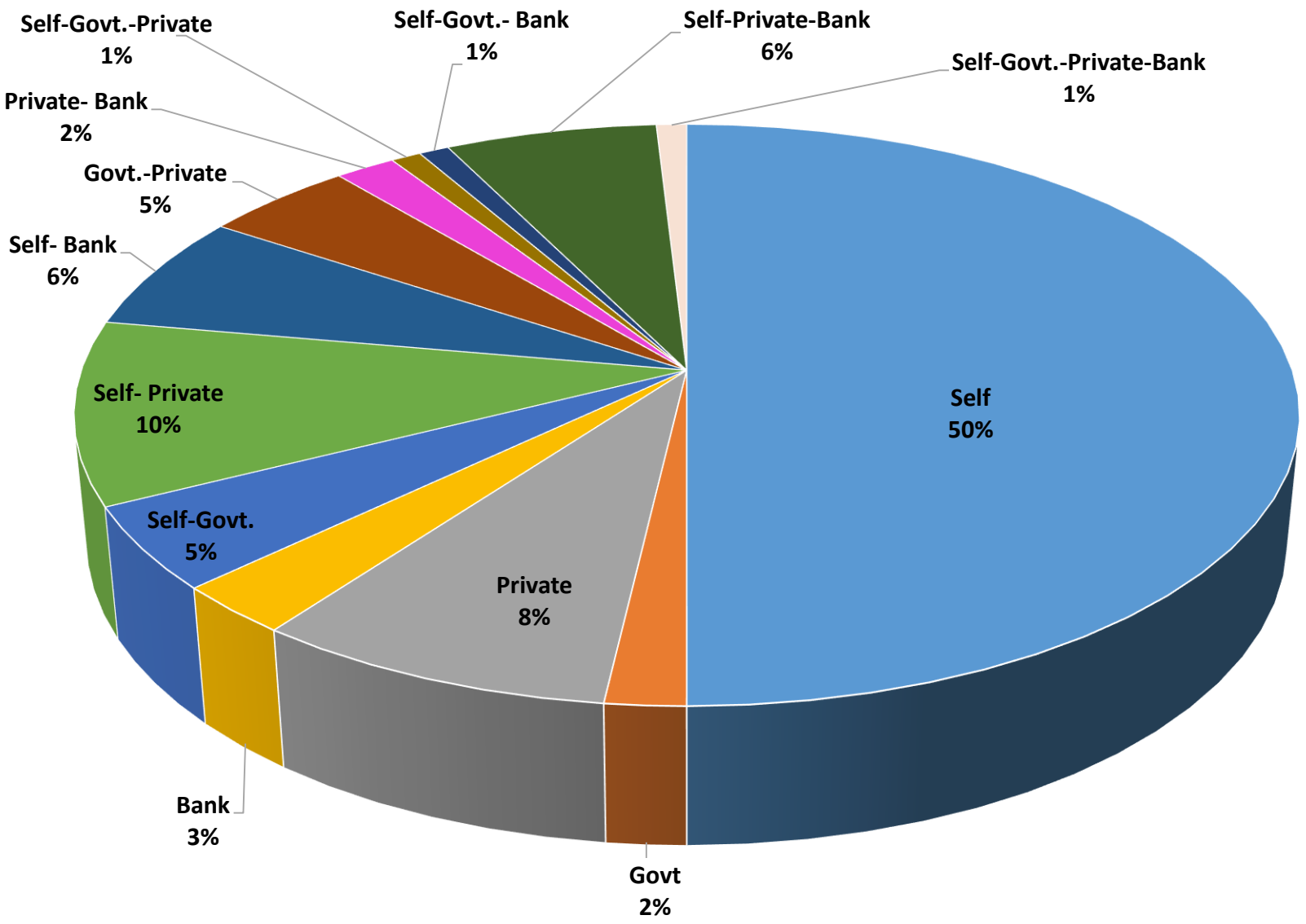
Consultation / Support

- Crop Advisories
- Credit Facilities
- Value Chain System Interventions
- Knowledge Upgardation
- Certification
- Veterinary services

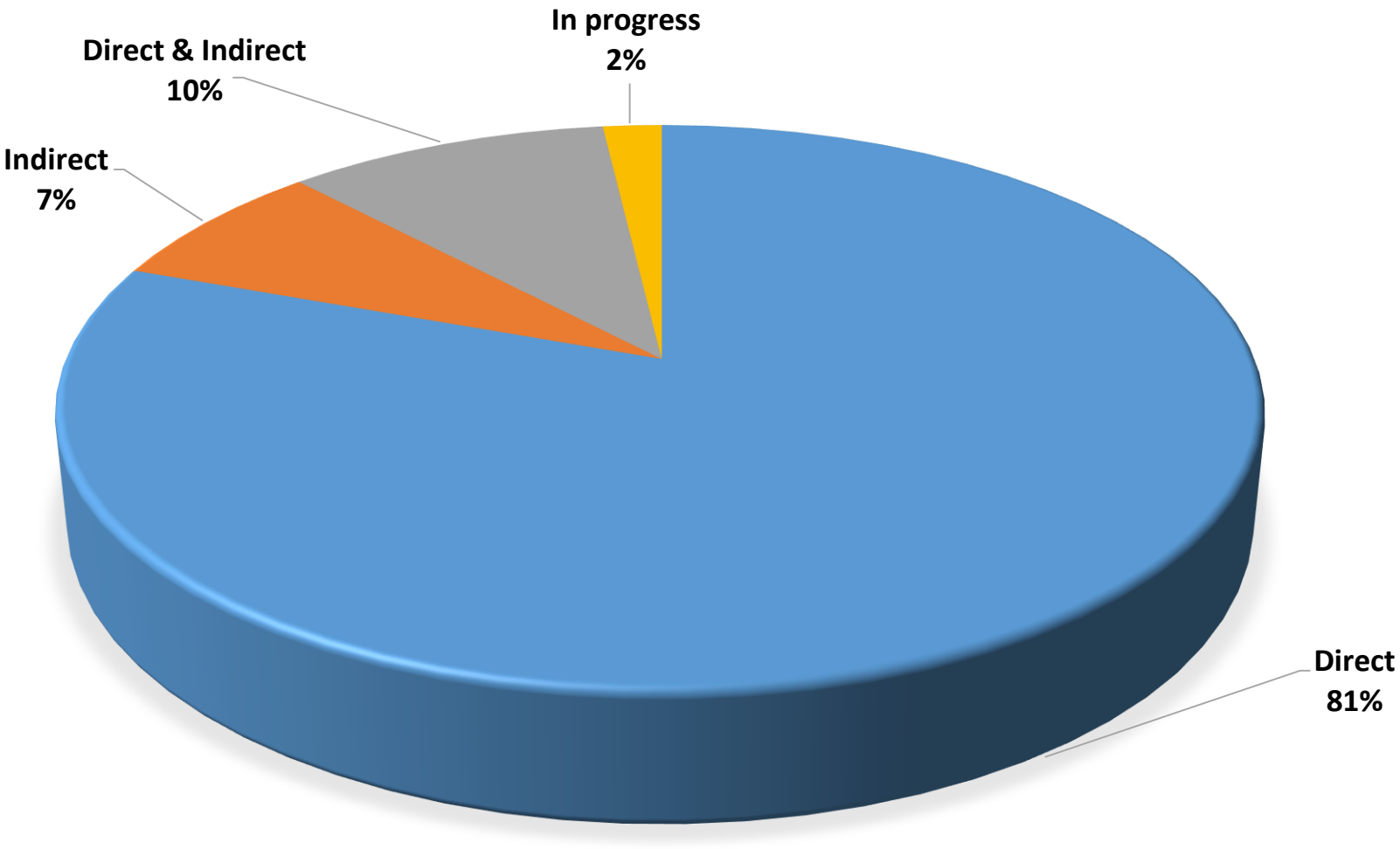
Start Ups based on domains and duration



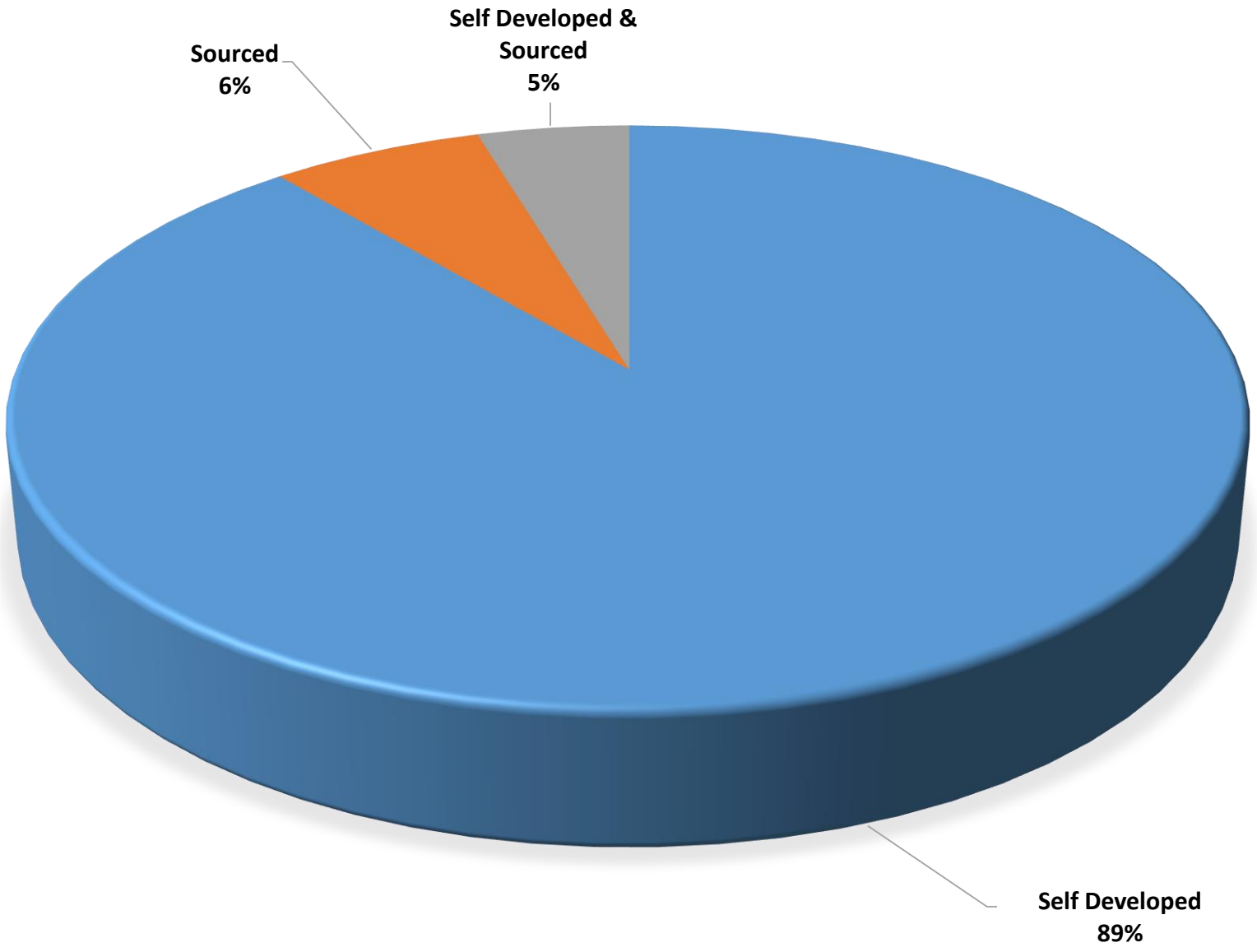
Start Ups based on financial sources



Start Ups based on marketing channels



Start Ups based on technology sources



Issues & Challenges

- Funding
- Founders - Non agri & non marketing field
- Connecting with right business partners
- Clarity in regulations, e.g. drones
- Marketing & tapping pan India market
- Acceptance of technology
- Missing reliable agri data
- Consistent supply & quality; grading & logistics
- Knowledge about suitable grants & soft loans
- Assistance in IP protection & certification

Further Needs

- Market linkages
- Policy support
- Seed funding & Funding w/o collateral
- Price affordability to farmers
- Access to agronomic data agri supply chain knowledge
- Sponsorship for skill development
- Access to new FPOs and Pilot with FPOs
- Collaboration with Organized Players

Agripreneurship Support

- Innovative financing of farm operations in PPP mode
- A new breed of angel investors; eg. 280 in Coimbatore; Need to assess the dimension of this funding, mainstream for sustaining and accessing
- Digitalization and blended finance models, including angel investors as viable solutions of finance for agriculture
- Root capital for small farming as critical input package
- Agricultural venture capital investments as an opportunity, to be studied further for scale up and support
- Trend analysis and fund mobilization for agri-tech start ups
- Bridge funding for transformational start ups

Learning phase…

- Agri-incubator density, viability, sustenance; all dimensions of the enterprise
- Mentoring entrepreneurs comprehensively and hand holding
- Understanding farming; Start ups mostly Engineers & Urban - New insights, also grey areas: Agri-Connect
- Largely Aggregation, with storage, packing and delivery interventions; Negotiation skills for a win-win
- Ecosystem for Start ups, with Skillsets for value chain approach

TBI - New Ag. Schools

On the Ground

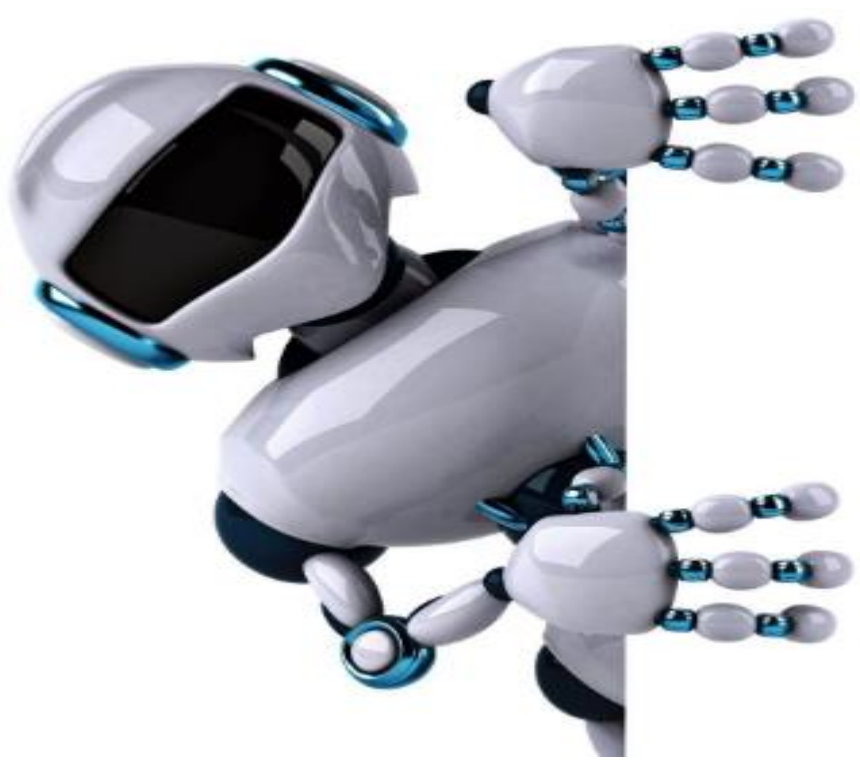
- Financing, Labour, Markets, Risk management
- Technology sourcing, sharing, complimenting (Need assessment, scale up, packaging & market orientation)
- Data sourcing and customising information into knowledge (e.g. Drone: Multilayers - Groundwater)
- Committed clientele unlike start ups in other sectors
- Acceptance & Awareness: Recognise and provide skillsets

Way Forward

- Innovation platforms: Open house in Agricultural Departments (all disciplines) at the District level too (Half a day quarterly)
- Interfacing Agri-Scientists with IoT domain, farm students working in Start ups - ideal in Bengaluru
- Federating Agri Start Ups: (i) Self regulation and Certification; (ii) Quality Assurance; (iii) Complimenting ideation and marketing activities (access to various States)
- Acquire, merge, etc. by overseas investors; Accelerators
- Compete & Cooperate; Trust & Professionalism; Respect and Social recognition

Transforming Agriculture to Agripreneurship (Charity (?) to Business)

- Sustainable Agriculture
- Profit-Prestige-Partnerships in Agriculture
- Farm-Business combine
- Agriculture as a sought after profession
- A Healthy and Happy India



Agriculture, Everybody's Business……

THANKS