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‘DIGITAL INDIA’ AS A DRIVER FOR INDIA’S AGRICULTURAL ECONOMY

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ASSIGNMENT ON ECONOMICS
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Introduction

India with 1.35 billion people, is the second most populated nation in the world after China. 65.97 Percent of the population still resides in rural areas according to data published by the World Bank and agriculture, with its allied sectors, is the largest source of livelihoods. 70 percent of India's rural households still depend primarily on agriculture for their livelihood, with 82 percent of farmers being small and marginal (ie with less than 2 acres of land holding).

The contribution of agriculture to GDP as per estimates for FY 2018-19 stands at 14.6 percent amounting to INR 6091.05 Billion¹ and has seen modest progress over the last five years. One of the main goals outlined by the present government has been to '*double*' farmer's incomes by 2022 fuelled by results of the 2011 census conducted by the National Sample Survey Office (NSSO), which estimated about 22.5 percent of farmer households living below the National Poverty line² {currently fixed at a daily expenditure of Rs 27.2 (about 30 cents) in rural areas}. The Agriculture sector remains a key focus area of the Government and a number of measures and initiatives have been implemented at the macro as well as micro level to enhance the performance of this sector. Concurrently, the Government of India has also launched a nation-wide initiative in Aug 2014 christened as '*Digital India – a programme to transform India into a digitally empowered society and knowledge economy*' which includes a number of initiatives for the agriculture sector as well.

The aim of this paper is therefore to examine the level of penetration of digital technology into the agriculture sector of the economy and how farmers are leveraging digital technology to uplift themselves from poverty with concurrent increase in output and productivity as well as enhancement of individual incomes.

¹ <https://tradingeconomics.com/india/gdp-from-agriculture>

² https://niti.gov.in/writereaddata/files/document_publication/DOUBLING%20FARMERS%20INCOME.pdf

Digital India

Launched in 2018, the '*Digital India*' programme is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy. The vision of the programme focusses on three core areas viz digital infrastructure as a core utility to every citizen, governance and services on demand and digital empowerment of all Indian citizens. Digital India is an umbrella programme that covers multiple Government Ministries and Departments. It weaves together a large number of ideas and thoughts into a single, comprehensive vision so that each of them can be implemented as part of a larger goal.

The programme intends to realise its vision through nine pillars or growth areas with each of them being a complex programme in themselves requiring integration and coordination across multiple Ministries and Departments of the Government³. These nine pillars are as follows:-

- Broadband Highways.
- Universal Access to Mobile Connectivity.
- Public Internet Access Programme.
- e-Governance: Reforming Governance through Technology.
- e-Kranti - Electronic Delivery of Services.
- Information for All.
- Electronics Manufacturing.
- Information Technology for jobs.
- Early Harvest Programmes (projects with short and expedited timelines).

The Expanding Digital Eco-System

Growth of Mobile Communication in India. India has seen a rapid growth in the field of communication and mobile telephony over the last two decades. According to data released by the Department of Telecommunications, India had a total of 3.58 million mobile subscribers in 2001 which has now grown exponentially to almost 1.16 billion subscribers in 2019 (Telecom Statistics

³ <https://digitalindia.gov.in/content/introduction>

2019). When assessing the growth of telecom subscribers in the rural sector (both fixed line and mobile), the number of subscribers have increased from just 18.54 million in 2006 to 514 Million in 2019, a staggering '*28 fold*' increase in the number of rural subscribers as compared to urban subscribers which increased by only '*5.4 times*' in the same period.

Internet Users in India. India was assessed to have a total of 560 Million Internet users in 2019 which is expected to grow to 667 Million by 2023. Out of these 560 Million, 290 million are internet users from rural areas with digital adoption now being driven by rural India registering a 35% growth in internet users over the past year. Increased availability of bandwidth, cost-effective data plans and enhanced awareness driven by government programmes seem to have rapidly bridged the digital gap between urban and rural India enabling penetration in the rural sector to increase from 9% in 2015 to 25% in 2018⁴. Implementation of the National Broadband Network is also playing a key role in facilitating the spread of the internet network across the country.

Proliferation of Smart Phones. The proliferation of smart phones has been another impressive growth story in India and has substituted desktops for many Indians who use it for a wide variety of services ranging from finance, education, entertainment, bookings etc. According to market research firm techARC, India had 502.2 million smartphone users as of December 2019, which means half a billion of Indians are now accessing wireless broadband through smartphones (in addition to wired broadband connections). With the extremely affordable entry level smart phones being available for a starting price of as low as Rs 5000 (USD 66), the market is set to experience further growth and numbers are likely to reach 859 million by 2022 according to current market predictions⁵.

The 'JAM' Trinity – Core Elements for Digital Inclusion at the Individual Level

'*JAM*' represents the Trinity or the three interlinked pillars for inclusion and integration of the Indian population and represents the following key elements:-

⁴<https://www.livemint.com/industry/telecom/internet-users-exceed-500-million-rural-india-driving-growth-report-1552300847307.html>

⁵<https://economictimes.indiatimes.com/tech/hardware/smartphone-users-expected-to-rise-84-to-859m-by-2022-assochem-pwc-study/articleshow/69260487.cms>

- ‘**J**’ for Jan Dhan (Zero Balance Accounts for the poor enabling banking and financial inclusion).
- ‘**A**’ for AADHAR (Unique Identification Code for every single Indian Citizen).
- ‘**M**’ for Mobile.

While the rapid expansion and growth of mobile communication and internet penetration discussed above provides the framework for digital transformation and outreach across the Indian sub-continent, the ‘*Trinity of JAM*’ has revolutionised implementation of government sponsored assistance schemes by linking Jan Dhan accounts, Mobile numbers and Aadhar cards of all Indians to directly transfer subsidies to intended beneficiaries and eliminate ghost beneficiaries, middlemen, intermediaries and cash as well as commodity leakages. The JAM Trinity unleashes its full potential when *firstly*, a unique and duplication free AADHAR identity is obtained which *secondly*, facilitates in opening of a Zero Balance Account and *thirdly*, the account can thereafter be operated or monitored through the registered mobile number of the individual completing the ‘*triad of enablers*’ for an individual citizen. The government is now in a position to utilise this digital infrastructure and internet eco-system to undertake transfer of subsidies and cash allowances directly into an individual’s account under the ‘*Direct Benefit Transfer*’ platform.

The Primary Integrator – The Mobile. The Mobile Phone has emerged as the ‘*primary integrator*’ to link individual components of the digital transformation initiative facilitating ‘*Last Mile Connectivity*’ with the intended beneficiary of the financial inclusion projects / welfare initiatives. With a mobile, the control of financial management with respect to receipt of government subsidies, banking functions, transparency of transaction and access to information; have all been transferred from intermediaries and middle men to the individual, plugging leaks and corruption.

Uniquely, for many Indians, the first experience of the Internet has been on a ‘*Smart Phone*’ and not through a traditional Desktop, Laptop or Tablet. Today, the mobile phone serves as a ‘*one stop kiosk*’ for many Indians not only for secure banking and financial transactions but also as a platform for receiving authentications, One Time Passwords, access to information, monitoring receipt of government entitlements, updates, access to government apps and portals in vernacular

languages, education, ticketing, bookings, SMS alerts and many other facilities. Most interestingly, one of the biggest revelations about the rapid expansion of use of mobiles across India was that even ***officially illiterate*** people were able to use smartphones, access internet, execute financial transactions through mobile payment apps as well as use Social Media. ***The Mobile Phone has therefore truly empowered every Indian irrespective of his or her social and/or economic status and has transformed the Indian citizen into an active participant in ‘governance’.***

Agricultural Reforms and Initiatives Riding on the ‘Digital India’ Backbone

Having discussed the foundational framework for the transformation in governance and execution of assistance programmes described above, a few of the major schemes of the Agriculture sector which are functioning on the ‘***Digital India***’ backbone are elucidated in the succeeding paragraphs.

National Agriculture Market. National Agriculture Market (eNAM) is a pan-India electronic trading portal which networks the existing Agriculture Produce Market Committee (APMC) wholesale markets across the country to create a unified national market for agricultural commodities. Small Farmers Agribusiness Consortium (SFAC) is the lead agency for implementing eNAM under the aegis of Ministry of Agriculture and Farmers’ Welfare, Government of India. eNAM intends to promote uniformity in agriculture marketing by streamlining of procedures across integrated markets, ***removing information asymmetry*** between buyers and sellers and promoting real time price discovery based on actual demand and supply. The integration of APMCs across the country is intended to be achieved through a common online market platform to facilitate pan-India trade in agriculture commodities, providing better price discovery through a transparent auction process based on quality of produce along with timely online payment. The eNAM portal can be accessed through a Mobile App as well. Currently, there are 16.6 Million farmers, 942 Farmer Produce Organisations, almost 200,000 Agents/Service Providers and 785 vegetable/grain markets that are linked to the eNAM network from 16 states and two Union Territories⁶ gradually moving

⁶ <https://enam.gov.in/web/dashboard/stakeholder-data>

towards the vision of '*One Nation – One Market*'. Implementation of eNAM has completely neutralised the role of middle men and agents who used to exploit farmers by buying their produce at less than market price and then selling them at higher profits.

m-Kisan Portal – Mobile Based Services for Farmers. With the burgeoning proliferation of mobile phones in the rural sector, amongst other ICT initiatives viz internet, touch screen kiosks, agri-clinics, private kiosks, mass media, Common Service Centres, Kisan Call Centres etc, mobile telephony (with or without internet) has emerged as the most potent and viable tool of agricultural extension. With this as the driver, an SMS portal was launched in Jul 2013 which has empowered all scientists, experts and officials from Central and State Government Organizations in Agriculture & Allied sectors (including State Agriculture Universities, Agriculture Science Centres, India Meteorological Department, Indian Council of Agricultural Research Institutes, Animal Husbandry, Dairying & Fisheries etc.) to give information/services/advisories to farmers by SMS in their language, based on area or region specific agricultural practices and preferences of farmers. Since the launch of the portal, a total of 9.2 Billion SMSs have been posted by various authorities to reach out to farmers across the length and breadth of India. (Website. <http://mkisan.gov.in/>)

Farmers' Portal. This portal has been designed to serve as a '*one stop kiosk*' for the farming community and the agriculture private sector to access information as well as services relating to agriculture, animal husbandry, fisheries, production, sale/storage and to supplement existing delivery channels. Once logged into the Farmers' Portal, a farmer will be able to get all relevant information on specific subjects around his village/block /district or state. This information will be delivered in the form of text, SMS, email and audio/video in the language he or she understands. Farmers will also be able to raise specific queries as well as give valuable feedback through the Feedback module specially developed for the purpose. The portal gives information on seeds, fertilizers, pesticides, farm machines, soil health, harvest and post-harvest advise, crop management, government sponsored schemes and programmes, export-import related information as well as a database of suppliers of farm equipment, fertilisers, seeds etc. (Website. <http://farmer.gov.in/>).

Farmer Facilitation App. Launched in July 2015, the Farmer Facilitation App or '*Kisan Suvidha*' is India's first mobile application to bring Agricultural Produce Marketing Committee (APMC), farmers and commodity agents/merchants on one platform/online benefitting all three stakeholders. Farmers can observe live auction of any commodity & APMC, price variations- maximum, minimum and average price of any commodity for any day/ month/ year. Farmers do not have to be physically present at auctions and information is provided to App Users through a SMS facility regarding auction price and total amount to be collected from the agents. The App provides a wide variety of information relevant to farmers, agents and government officials which *inter alia* include individual agent data with respect to commodities traded, minimum-maximum & average price of all commodities, details pertaining to gate passes, auctions, cess collection, goods damages, village wise commodity stocks, revenue generated, market information and stocks in any of the markets all over India. (Website. <http://www.kisaansuvidha.com/>)

Access of Schemes through Apps. With the aim of linking various agriculture digital portals of the Government with the farmers, a large number of agricultural schemes launched by the Government are being made accessible to the farmers through Mobile Apps which can be downloaded through 'Google Play store' as well as individual portals of each scheme. A few of these are listed below:-

- **m-Kisan App.** This app enables farmers and all other stakeholders to obtain advisories and information being sent by experts and government officials at different levels through m-kisan portal without registering on the main portal.
- **AgriMarket App.** The mobile application has been developed with an aim to keep farmers abreast with the crop prices discouraging distress sales. Farmers can get information related to prices of crops in markets within 50km of their own device location using the AgriMarket Mobile App. This app automatically captures the location of the farmers using mobile GPS and fetches the market prices of crops which fall within the range of 50km.

- **Farmer Logistics or Kisan Rath App**. Gives details of logistics companies for transportation of farm produces based on location from farms to the market.
- **Multi State Cooperative Societies (MSCS) App**. This is an android based mobile app assisting Cooperative Societies to know the status of their registration and people can search for registered society around their location.
- **Mahalanobis National Crop Forecast Centre (MNCFC) App**. This Android based application, developed by National Remote Sensing Centre is useful for field data collection for crop assessment using satellites. The application can be used for collecting field photographs (640x480 resolution), GPS coordinates and field information, such as crop type, condition, sowing date, soil type, etc. The farmers can also upload pictures taken through their mobile devices depicting status of the crops, varieties and soil as crowd sourcing.
- **Crop Info App**. The Crop Info App provides production technology of commercially important horticultural & agricultural crops on a smartphone with details pertaining to production aspects, post-harvest technology, processing possibilities and market information.
- **Digital Mansi India App**. This App assists in checking the latest Indian agricultural commodities Mandi (wholesale markets) prices from different states and districts. Easy to use and intuitive, the app enables farmers, traders and all others to know the updated Mandi price from anywhere and is synced with the Indian government portal Agmarknet.nic.in
- **Farm-o-pedia App**. The application is a multilingual Android application targeted for rural sectors of the state of Gujarat. The app is useful for farmers or anyone related to agriculture and provides information on suitable crops as per soil and season, crop wise information, weather in area and cattle management.
- **Crop Insurance Mobile App**. This App is designed to calculate Insurance Premium for notified crops based on area, coverage amount and loan amount in case of loanee farmer. It

can also be used to get details of normal sum insured, extended sum insured, premium details and subsidy information of any notified crop in any notified area.

Comparison of Indicators – Spread of Digitisation/ Mobile vs Performance of Initiatives

A comparison of progress in expansion of JAM pillars and concurrent improvement/progress in performance of welfare schemes in approximately the same time frames is depicted in the following table (*Table 1.1*):-

<u>Field</u>	<u>Base Year</u>	<u>Qty</u>	<u>Assessment Year</u>	<u>Qty</u>	<u>Change</u>
<u>Mobile and Digital Sectors</u>					
Total Telephone Subscribers	2009	429.73 Million	2019	1183.1 Million	+753 Million
Rural Telephone Subscribers	2009	123.51 Million	2019	514.27 Million	+390.76 Million
Rural Internet Subscribers (Mob)	2015	107.56 Million	2019	227.1 Million	+119.54 Million
Rural Internet Subscribers (Broadband)	2015	21.32 Million	2019	190.03 Million	+168.71 Million
Rural Internet Density Per 100	2015	12.89	2019	25.36	Almost Doubled
Rural Broadband Network-connecting Village Committees	2019	-	2020	138,440 Village Committees out of 250000 across India connected*	*Project completion by 2022
Optic Fibre Cable Laid	2020	433046 Kms	-	-	*Project completion by 2022
<u>Assessment of JAM, Major Agriculture Schemes and Indicators</u>					
New Zero Balance Accounts	Aug 2015	179 Million	Apr 2020	382Million	+207 Million
Direct Benefit Transfer Beneficiaries	FY 2014-2015	228 Million	FY 2018-19	590 Million	+362 Million
Amount of Funds Transferred under DBT	FY 2014-2015	389.26 Billion Rupees	FY 2018-19	2140.92 Billion Rupees	+1751.66 Billion Rupees
Contribution of Agriculture to GDP	FY 2014-2015	16057.15 Billion Rupees	FY 2018-19	18572.33 Billion Rupees	+2515.18 Billion Rupees
Budgetary allocation for Agriculture, Irrigation and Farmers Welfare	FY 2014-2015	310.63 Billion Rupees	FY 2020-21	1600 Billion Rupees	+1289.37 Billion Rupees

<u>Field</u>	<u>Base Year</u>	<u>Qty</u>	<u>Assessment Year</u>	<u>Qty</u>	<u>Change</u>
Agriculture Mkts connected under e-National Agriculture Market	Apr 2016	21 Agriculture Markets integrated on e-NAM	May 2020	785 Agriculture Markets integrated on e-NAM	+764 Markets
No of Agriculture SMS sent through mKisan Portal to Regd Mobiles	Apr 2014	303 Million Messages	Apr 2020	9.2 Billion Messages	+8.8 Billion messages
No of Agriculture Advisories on SMS	Apr 2014	58,678 Advisories	Apr 2020	412,886 Advisories	+354,208 Advisories
Production of Food grains	2015-2016	251.6 Million Tonnes	2018-2019	283.4 Million Tonnes	+31.8 Million Tonnes
Area under Irrigation	2015-16	551586 Hectares	2019-2020	840820 Hectares	+289,234 Hectares
Direct Benefit Transfer of Agri Machinery	2014	69021 single implements	2019	201839 single implements	+132,818 single implements

Sources – Government of India Data

Graphical Representation

In addition to the table represented above, a few graphs pertaining to the growth of the digital ecosystem and a few indicators in the agriculture sector are represented below for a comparative assessment.

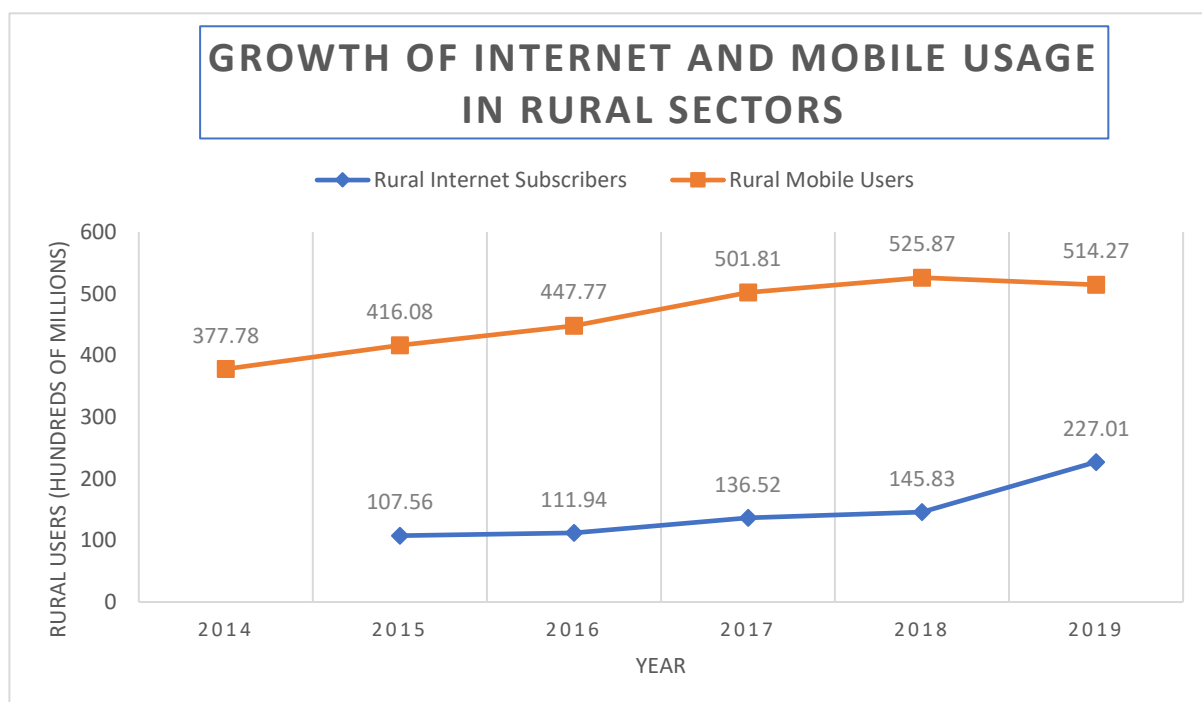


Figure 1.2, According to Telecom Stats 2019

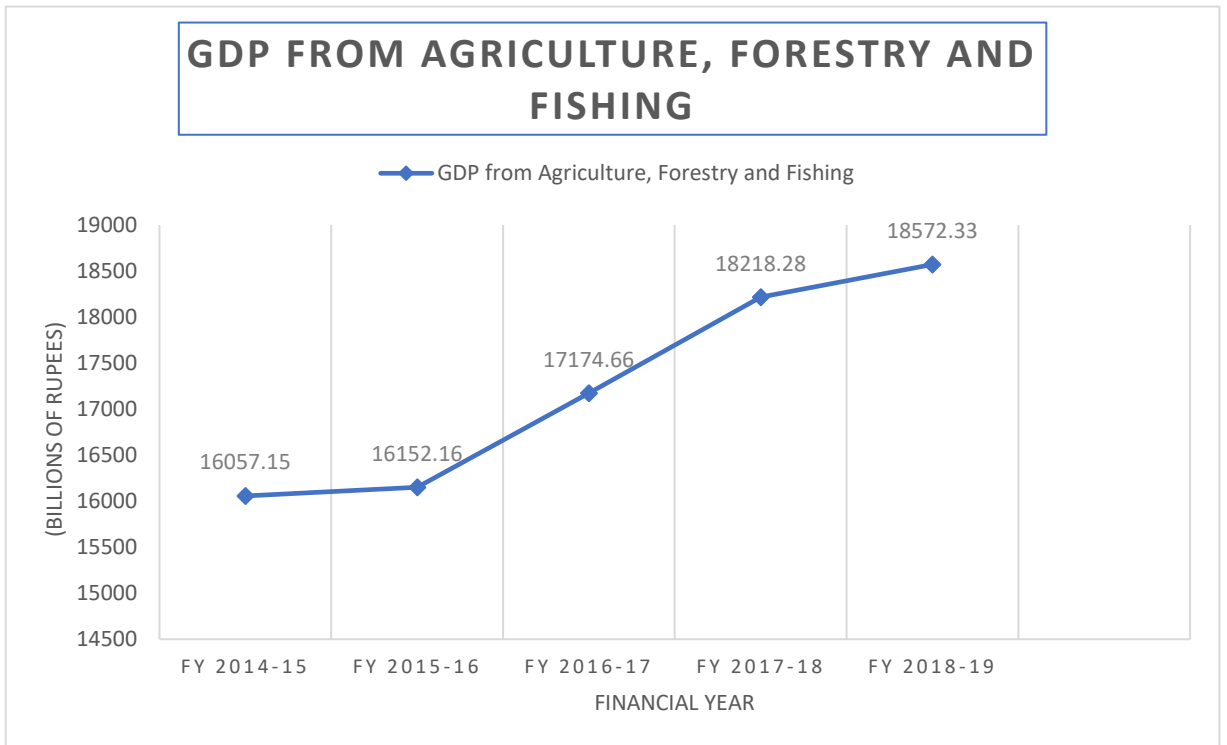


Figure 1.3, According to TradingEconomic

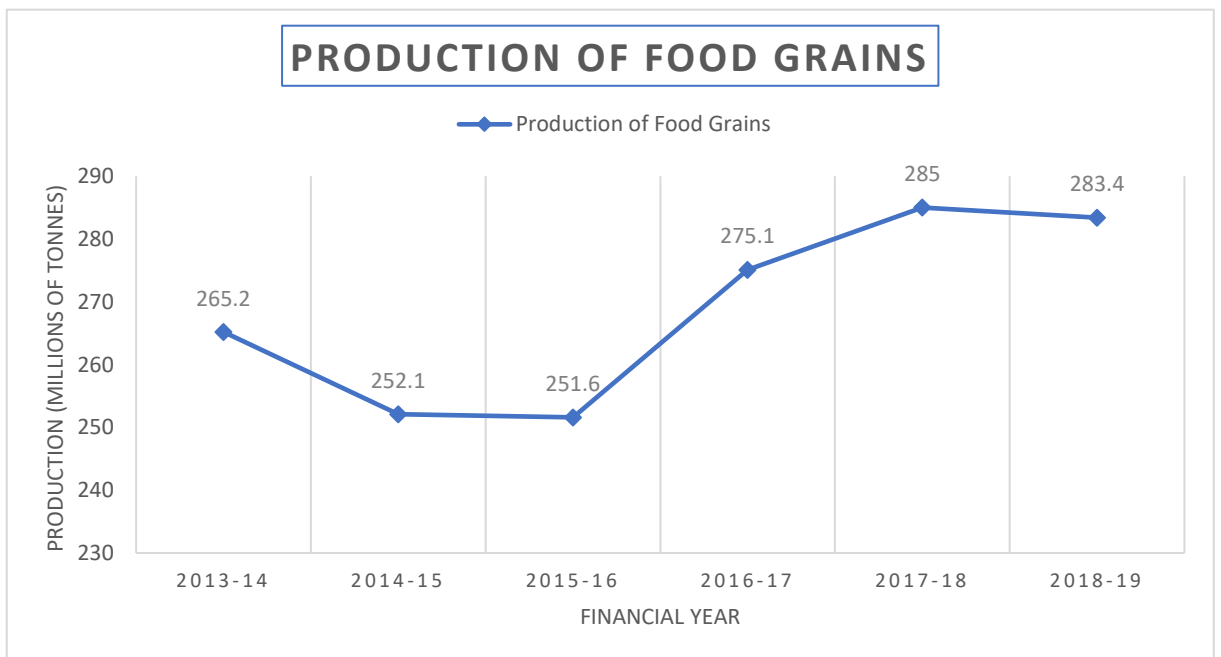


Figure 1.4, According to Nabard.org

Underlying Linkage Between Digital Transformation and Growth of Agriculture Sector

A comparison of the expansion of internet and mobile phones in the rural sector with some key indicators in the Agriculture sector listed at Table 1.1 as well as illustrated in the graphs above depict a steady growth in both sectors. While the Government of India has taken aggressive measures and

initiatives to '*double the farmers incomes*' by 2022 which include provisioning of quality seeds, fertilisers, scientific know-how, soil testing, harvesting techniques, modern irrigation techniques, rain water conservation, distribution of modern farm implements, value addition to products, cold storage facilities etc, the concurrent digital transformation and exponential growth in mobile telephony has enabled higher outreach, easy access, widespread inclusion and reliable feedback on the reforms in the agriculture sector and developments / induction of latest technology. Based on the aforementioned deduction, a few focus areas which need to be implemented or ongoing initiatives which need to be more aggressively pursued are as under:-

- Forthcoming surveys by the NSSO should include statistics on the extent of the role played by the '*Digital India*' initiative towards growth in the agriculture sector in the survey methodology and questionnaire.
- Additional periodic (annual/biennial surveys) need to be instituted by independent agencies to assess the effectiveness of agriculture welfare schemes. The aim being to establish a reliable feedback mechanism and bring transparency in implementation of schemes. These data points would be critical in identifying bottlenecks and applying 'mid-course' corrections. The survey and feedback system for National Level Monitoring has to be '*digital*' and '*instant*' through technology supported by field visits for interaction at grassroot levels for beneficiaries.
- Undertake aggressive publicity of new initiatives and welfare schemes at grassroots levels by leveraging the power of print, audio, television and social media in vernacular languages. *This would be the key in ensuring that the maximum farmer populace is brought under the umbrella of various schemes.*
- Focus on '*Computer*' and '*Smart Phone*' literacy for farmers who are beyond the education years bracket while continuing to focus on capsules on exploitation of digital tools in the school curriculums for existing and future students.
- Ensure that all Apps developed for the agriculture sector are available in all local and vernacular languages supported by pictorial descriptions / Audio User Interfaces.

- Connecting each and every of the 250000 Village Committees in the National Broadband Network by 2020 bringing e-Governance at the grassroot levels.
- Regular updating and publicity of number of '*Log-Ins*', '*Registered Users*', '*Hits*' and '*downloads*' to encourage greater participation in e-Agriculture from the farming community.
- Websites of the Ministry of Agriculture (both at the Centre and State levels) currently display '*busy and congested*' User Interfaces and need to be transformed to user friendly versions to cater for all levels of computer literacy.
- Rating of various State Governments in performance in the agriculture sector and effectiveness in implementation of various agriculture reforms, welfare schemes as well as other macro indicators to instil a sense of competition and accountability. This should be a well-publicised nationally covered event with aggressive media coverage on national as well as vernacular channels.

Conclusion

There are two underlying facts which emerge clearly. The first is that there has been steady growth in the agriculture sector in the last five years and the second is that there has been a '*digital revolution*' in India in the same timeframes. It is time to connect the two and ensure that they are inter-linked as well as intertwined and not mutually exclusive. If initiatives for supporting and growing the agriculture sector and farming community have always existed inspired by the socialist nature of India guided by the Directive Principles of State Policy which are enshrined in the constitution and provide the state with the '*fundamentals of governance*', what has really changed?....And as is evident from the research elaborated above; what has changed is the Digital Transformation of India, which *prima facie* indicates a higher outreach, easy access, widespread inclusion and reliable feedback of social and welfare initiatives. The change has also been the empowerment of the citizen through this revolution which makes him an equal partner, stakeholder and executor in governance when he actively participates in these schemes and initiatives. Future successes to achieve the ambitious goal of '*doubling the farmer's income*' by 2022 is conditional on how we can enhance the

effectiveness of the four aforementioned pillars ie outreach, access, inclusion and feedback riding on 'Digital India'.

No longer can a member from the agriculture community or a small farmer wait passively for change to come to his farm; today's eco-system and technological environment demands that he claims and avails what is due to him without fear or prejudice. After all, '*Nation Building is the responsibility of ordinary citizens who constitute the Nation as much as it is for those who govern the Nation*'. Amongst other sectors, agriculture is India's mainstay with 43% of its population involved in agriculture, forestry, fishing and horticulture; and therefore, strengthening the partnership between the agricultural community and the government through the opportunities afforded by the Digital Transformation of our country is only natural and the way ahead.