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Big Data Analytics in Agriculture

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***Abstract*— This paper discusses agricultural difficulties as well as the strategies utilized to apply the offered remedies. Research and incremental growth with the use of data analytics are the only ways forward for any industry nowadays.By Using data analytics in agricultural sector we can analyze the historical data and take out the useful information which helps enhance agricultural patterns and save resources.Big Data will result in severe modifications mostly in roles and power relationships among various parties in today's industrial food supply chain networks. Using Big data techniques the farmers have increased revenue and decreased the wastage and chances of loss. Today, this can be seen in a variety of agricultural fields. In this work, we present feasible solutions and minor improvements to the publications previously reviewed. Today's agricultural industry is flourishing, and after the green revolution, it's past time to make the necessary modifications and delve further into the subject's nuances.**

***Index Terms*— IoT, Big Data analytics, Agriculture, Smart Farming, Precision Agriculture.**

I. INTRODUCTION

The process of analyzing large data sets is known as big data analytics. it is used to find patterns that are hidden or encrypted,, market trends such as in stock markets and other relevant financial sectors, client preferences, relevant business information(corporates),sports analytics and many other unknown linkages which can be prevalent for future endeavors. The study's findings may lead to more effective marketing, new revenue opportunities, improved agriculture planning, enhanced farmer productivity, competitive advantages over competitors, and other business benefits.

For majority of rural households, agriculture is their primary income which includes poultry,dairy and other related activities as well. These rural families relies not just on one trade but they use multiple activities to sustain their livelihood such as agro - forestry,poultry,farm animals, fishing, and aquaculture, in addition to farming. These activities are easily maintained by the farmers and help them with other agricultural needs as well.

Every day, technology advances at a breakneck speed. It has spread far and wide, from urban to rural areas. The government and the farmer are interdependent. for the sake of improving agricultural output and supporting Small-scale farming-related companies, the central government has come up with multiple ideas and has made several attempts to improve farmer's production growth .Some apps have also been developed to assist farmers in a positive way.

The farmer might use mobile texting services to communicate with his or her customers.The specifics of their agricultural-related inquiries It.

Farmers will receive information from the agro-vendor. In addition, it includes meteorological data, soil content data, and other useful information. To supply the agriculture things, they need to go to a nearby market.

In today's day and age with the limited resources that we have along with the side effects of climate change it is imperative for us to produce food in larger quantity in a sustained manner.

With advances in technology, processing power of the systems and analytics driven approach it is possible to digitize agricultural sector to a large extent. This may beable to deliver innovative answers to these complicated problems.Today the purpose of science is not only to advance theoretically but also progressively implement the solutions along the way. By providing evidence for and assisting the design and usage of digital technologies in order to achieve positive results while avoiding unforeseen consequences. This necessitates taking into account data governance design in order to ensure that the benefits of digital agricultureare distributed equitably, as well as how digitizing agricul- tural sector through analytics may alter agricultural business models along with their implementations, which includesthe farm structures, value chain, stakeholder roles, power relations,networks and governance. All these alternations and possible solutions provided necessitates (quick)research

which is not restricted to a single field but is interdisciplinary in nature.socio-ethical issues are also to be considered within these studies for a wholesome overall evaluation.

Applications of big data are:.

- Government: The data that is captured from multiple sources such as sensors, satellites, CCTV and traf- fic cameras, calls, emails, social media, IT spaces, academia, and other relevant sources require effective data storage and analysis for better management and governance as it helps analyze the trends and needs of the public at large.
- Banking:In the banking sector sub categorised- insurance sector especially requires huge amount of data to make their schemes a success. along with that financial sector at large relies heavily on analysis of datafor day trading stock market trend analysis etc.Big data analytics is heavily used in this industry to store data, increase scalability, and get relevant business insights.
- Healthcare:the communication silos problem is reduced greatly by using big data-based protocols. This is so- lution oriented problem which still need to be imple- mented which will in future help reduce the excess cost and minimize issues caused due to communication silosto a very large extent.
- Telecom: Real-time big data analysis yields valuable forecasts for deriving relevant business information through analytics . for example by providing revenue generating services to clients along with the considera- tion of network and customers.

II. BIG DATA ANALYTICS

Big data analytics is the application of analysis of very large data sets which have been gathered through relevant sources, ethically produces and economically sustained by huge corporations for effective application of this analysisto grow their business or customer. the data gathered doesnot make any sense on its own. it is scattered. this data needsto arranged in a logical manner and then cleaned. the datais categorised as structured unstructured and semi structured depending on the type of data collected. it is available is varying sizes ranging from terabytes to zettabytes . to make sense of this data big corporations or governments requireto process the relevant data and perform analysis which includes relevant questions helping progress and growth in that specified field. today all the data found on the internet and beyond is categorised under big data . this data cannot be processed by the traditional RDBMS systems and management and usage of this data is with low quiescence. Big data can be identified by the following characteristics:

1) Volume
2) Velocity
3) Variety
4) Veracity

Multiple technological domains today such as Artificial intelligence, mobile analytics, social media analytics, and the Internet of Things (IoT) which include smart devices are producing heavy and intense data for which even the complexity of the data increases making it difficult to analyze the data further.The more number of devices that are being added the more data is generated. This is increasing the complexity of the data even further as integration and application of this data needs to be thought through. For example, big data today is collected through all the possible devices present in our surroundings from metal detectors, cameras, mobile phones bias, videotape/ audio, networks, log lines, transactional operations (ATM machines), web, and social media — much of it generated in real time and at a veritably large scale. This data is further stored and cleaned up for analyzing but each stage produces its own challenges and difficulties. Analysis of big data is not a mandatoryfield. it is there to assist and help businesses , corporates, individuals , analysts make better decisions. The analysis of data is there to assist and help the decision maker make the best possible decision that is available to them. Analytics today has not only helped businesses , governments and individuals make better decisions but it also overall a process consisting of multiple sub categorical complex issues that need to be addressed. these issues are addressed by other tools available for mining the data, processing,cleaning etc. all these steps combined the analyst finally generates a data analysis models and then processes the data for relevant and required information.

III. BIG DATA ANALYTICS WITH AGRICULTURE

Agricultural sector is vast and diversified. coming to the technological aspects here, big data specifically deals with the Electronic Farm Records (EFR), these contain allthe pertinent information related to the crops pattern, soil samples, temperature of the soil, climate temperature, climate conditions,rush charts, plant specific information,nutrient information(relevant to the plant is is to be grown) ,conductivity,moisture in the climate,soil moisture,past records of the field,past records of the climate,past records of the plants to be grown, seed analysis, seed sizes,seed structure,health analysis of seeds, temperature maps of the area,pH,supplement requirement , past development records, protection and yield related data, real time), and papers in agribusiness opportunities and competitive. By simply diagnosing the various variables, the analyst is able to capture all of the data from these sources and then further reveal confederations, grasp examples, and patterns in order to improve horticultural fabrics, raise crop profitability, and cut costs.

India is a country with a strong focus on agriculture as majority of the Indian rural population is based on this sector for their livelihood. Indian frugality is based solelyon agriculture. In the coming years, the rapidly increasing population and shrinking texture of the land will become a severe issue for Indian farmers and their upcoming generations. To meet today's demand for the rapidly increasing population of the country, the proportion of agrarian products that are produced required increased rate of productions the population increases(this can be modulated according to real

time requirements of the population). To put it another way, we'll have to learn to generate more with less i.e more output using less land ,less seeds ,less water ,less nutrients andso on. Agriculture been revolutionised in India before.The two revolutions saw drastic and dramatic changes in thepast which have forever changed the sector for the better. The first revolution saw the mechanisation of the products during the artificial revolution, and the second revolution in agriculture saw the development of fungicides,insecticides and other agricultural chemicals where is still widely used today. These chemicals were widely employed during the green revolution as the effectiveness of these chemicals was massive and seen. Now with the third revolution i.e. the Big data revolution it is possible to manage agricultural activities with much more precision and accuracy. As a result, utilizingHuge Information and Big data in agricultural business has the understanding of the objective of creating more withless. As a result, perfect cultivation is accomplished. Today the application of data analytics is nothing but utilizationof the available data and analysing it to its core. more the utilization of huge information more accurate and precisethe information gets. In data analytics information mining procedures are also of significance as ultimately they are the building blocks and finally determine the quality of the infor- mation and conclusion obtained. When these innovations in big data are utilized along side the cultivation information, itin turn really makes a difference to the extend that the trim abdicate item in spite of the variables influencing cultivationcomparative as precipitation, soil substance, bothers, etc are all measured and obtained correctly. The sharpening of the data(i.e the increase in accuracy of the data collected) has to be done from a little zone to the expansive region that is tobe analyzed and used for cultivation.

The offered assistance that the producers tend to borrow are the the unused advances from which they can get insightsfor their future crops. Grounded on the past information the field has been isolated into sub units depending on the soil surface, figure of the arrive and water position. Groundedon the changeability of the arrive subdivision, distinctive seeds to be sowed at distinctive administrations. This offers assistance to improve the edit abdicate product.

The main focus is to recognize the conventional cultivation practices and give us a solution on how to build yield of the agrarian things based on present day innovations. The other thing is to eliminate the use of harmful pesticides, over use of composts, providing appropriate watering systems and to provide the farmers with the best farming methods which would be helpful for expanding the efficiency of their yield [15].

IV. ROLE OF BIG DATA IN SMART FARMING

Farmers often express concerns about the increased con- centrations of unhealthy harvest or bad weather which leads to their losses. Technological change and globalization are the major drivers of structural change in agriculture.Smart sensors and devices generate massive amounts of data, al- lowing you to make extraordinary judgement.Big data but play a major role in improving the efficiency of the entire supply chain and alleviating food security concerns.Big Data provides farmers with information that makes it easier for them to maintain their data on rainfall patterns, water cycles, fertilizer requirements and other farm needs. Big Data also helps farmers to make smart and perfect decisions on crop needs, fertilization etc.

Big data analytics guarantees solutions for problems in the agricultural sector during cultivation of crops. If efficiently used, there would be a boom in crop productivity which would be beneficial for farmers in various ways [11].

This helps the farmers in turn to increase their farm yields. Technology these days like Cloud Computing and Internet of Things have been trying to introduce more robots and artificial intelligence in farming.The Internet of Things development is wirelessly connecting all kinds of objects and devices in farming. Smart farming uses big data to provide farmers with real-time insights on what different inputs are needed and how to utilize them, taking into account the emerging weather events or disease outbreaks.Data is col- lected through multiple means such as social media ,digital systems are also used such as IoT devices ,sensors,mobile devices etc [2]. There are different types of IoT sensors used for smart farming like Green house automation, monitoring of climate conditions , crop management, cattle monitoring and management, and agricultural drones. IoT is shaping agriculture in many ways. IoT devices used in smart farming provide tons of data that can keep a track of the performance of the equipment used and the staff performance. Smart farming has a better control over the output which tells us about the amounts of crop harvested in a particular season.

Future assumptions help us plan better for the production distribution and prevent losses or the chance of wastage. Automating multiple processes across the production cycle increases business efficiency. However, Big data technology has still not been fully conquered. Big data in smart farming is not affordable for all farmers. It requires huge investment and infrastructures and farmers are not yet able to afford it. Educating the farmers is the initial and crucial step to implement smart farming throughout the globe.

V. TECHNOLOGIES USED TO ACHIEVE SMART FARMING AND DEVELOP SOLUTIONS

- Internet of Things(Iot) and 5G - the biggest challenge of smart farming is connecting the IoT devices together since the farms are big and are spread across huge acres of land. Connecting wifi devices across the land is very difficult for regular farmers due to the cost factor. To help with these challenges 5G was introduced which is accessible anywhere and can connect more devices spread across huge farming lands.5G has low latency and can move data much more efficiently and in a fasterway than 4G.
- Use of Drones- Drones are devices that fly in the air and produce data. It uses Artificial Intelligence and reduces the work of farmers in certain ways.Drones take high resolution images with a special camera which is then

analyzed by AI powered softwares. Drones provide the plant height, yield estimation, irrigation updates etc to the farmers so the farmers don't have to manually walk down the fields and check the necessary updates of the crops

- Cloud Computing- Cloud Computing is a platform where all the data of the farm ius gathered on a single platform and can be accessible easily. It is budget friendly to share resources. Cloud computing makesit easier for farmers to make crop-related decisions.These decisions include the soil information,growth of the crops,consultations from the experts and data offarmers.
- Mobile Computing- Mobile computing provides various applications that provide information about agricultural methods,techniques,weather conditions, best prices of fertilizers available in the local markets,help identifying crop diseases etc.

In terms of data analytics, the smart farming model, which includes integrated technologies such as IoT, Cloud, and Mobile technology, employs the Map-reduce approach. It's simple to work with data that has several nodes. The procedure is split into two parts: map and reduce. Filtering and sorting are done via maps. Reduce, on the other hand, can conduct summary operations. As a result, predictive analysis is performed using this specific analytic technique.Because of the massive volume of data created by IoT sensors, itmay potentially be used for data mining. The data fromthe sensors is saved on the cloud platform as a flow. After preparing the data, the focus shifts to classification, attribute selection, algorithm implementation, and finally evaluation with pattern prediction. As a result, the output obtained can be visualised using a business analytics application and utilised to make decisions about fertiliser requirements, crop sequencing, weather patterns, and so on.

VI. POSSIBLE IMPACTS ON AGRICULTURE SECTOR

A. Meeting the food demand

Big data provides information regarding the changes in weather conditions, humidity in soil and other factors that affect crop yield. This makes the farmers make accurate decisions to increase crop yield. Farmers use the data collected by using technologies and make more profits and perfect yields. Farmers plant high quality seeds with proper certification that increase crop yields in an Eco friendly method. By using modern technologies the yield is not wasted and farmers are saved from losses because they meet up with the food demands.

B. Fungicides use optimization

Fungicide is a very common issue for farmers. They have a lot of side effects on the plants which leads to rotting of plants. Farmers use fungicides that are cheap and easily available. Big data offers precise fungicides operations in which they give farmers different suggestions and good quality fungicides to apply on the plants. This in turn helps farmers to reduce the use of chemicals on the plants.

C. Ranch outfit operation

Use of big data technologies and applications provides huge amounts of analyzed data. Satellites, robots, and various other farm equipment makes it easier for the farmers to keep a track of their machinery in the field.these technologies reduce costs used on fuels to make the machines work.

D. Force chain problems operation

Farmers use different delivery trucks for transporting, big data offers tracking opportunities and optimization techniques which reduces the travel time and wasting of food between the farmers and the market.

E. Yield Vaticination

To predict the yield(on variety of parameters) is the usage of data analytic technology and the variety of algorithms used to collect data and transform into into information based on the rainfall, chemicals, foliage, and many more such parameters which influence the results further. the perfection of decision making with the help of data analytics is very much valuable to the farmers. Different technologies today are helping the farmers and agriculturists grow the crops efficiently and bring in much more fluency in decision making whether it be to decide on where and when to plant seeds are to be bought, sown or how to space the seeds in the field with enhanced precision, when to water the crops and create regulated watering intervals, application of chemicals, and when to gather and further harvest the crops. This significantly reduces the need for homemade work and extra manual labour done by the labourers. thanks to remote and precise field operations this is drastically changing.

F. Food safety

Food related issues which occur in many people pan India are severe and may cause hospitalization to and in some cases even death. to ensure the food is clean , organic and uses minimum fertilizers and other harmful chemicals in today's husbandry practices is by ensuring the microbes which occur naturally in the soil are retained and nurtured. this doesn't require any effort from the farmer's end but needs the farmer to reduce the use of chemicals which may subsequently reduce his profit gains. the statistics collected on these crops can be used to analyse the moisture ,temperature ,climatic conditions of the area and many more integral factors which are necessary for the crop growth. these metrics need to be evaluated and studied to reduce the use of chemicalsand balancing out the inputs with other ISI standards which are placed for food safety.To dissect the collected data and turn it into authentic information required of various online tools is needed.Many soft-wares are available online which have easy access and open source making it economical and user friendly for the farmers. given today's scenario still the farmers needs to be educated in the usage and application of these tools therefore requiring experts from the domain. data

is collected through satellite imagery and stored within the data set. these images need to be of high quality for analysis of the soil samples and for detectors to work efficiently. monitoring by EOS can be implemented which produces this image data set in a very short span of time.

VII. CASE STUDY/REVIEW/MODEL OF THIS COMBINATION

There have been many case studies conducted to show the revolutionary impact of data analytic on the agricultural sector. Some of the case studies include:

A. Data Analytics with Precision Agriculture

One of the outcomes of current efforts to deploy precision agriculture using data analytics is satellite-derived management zones (SAMZs). SAMZ refers to a methodology for creating management zones as well as tools for applying the methodology. It helps calculate management zones from images of fields taken by equipment on board Earth-orbiting satellites [1]. This method's major data source is archived satellite photography. This technology has the advantage of allowing precision agriculture to be done with archival data at a low cost. Weather, crop types, crop management, soil types, and water drainage patterns, among other variables in a field, are all recorded in the archives. Germination percentage,plant emergence, physiological maturity, pest and disease incidence, and yield could all be monitored on a regular basis.

SAMZ methodology mainly comprises a web based interface and an algorithm is employed which helps automatically and quickly to build management zones using the historical image data from the satellite. A farmer can submit a request based on this research by either uploading data detailing a field border or sketching the boundary on a reference image. As a result, a farmer can start precision farmingas soon as he or she gets access to the website, without incurring the high costs of traditional precision agriculture data collection practices like soil sampling, mapping the electrical conductivity of the soil, or compiling multi-year crop-yield data. Because of recent advancements in remote sensing technologies, the SAMZ approach has become auseful tool for precision agriculture.

For reference, the agricultural area in Yadgir District, Karnataka, India was taken into consideration to test thetool's accuracy. Free cloud ISRO IRS P6 LISS-III data was used from 28 October 2009 and NDVI data sets from Januaryto May and November and December 2011 from the National Remote Sensing Center (NRSC), ISRO, Hyderabad's Bhuvan web portal. The delineation of management zones was one of the most important conditions for precision agriculture. The authors used Management Zone Analyst software to divide the agricultural region into six management zones in order to build a decision-support system for data analytics. Management Zone Analyst collects descriptive data, applies an unsupervised fuzzy classification approach to a set of cluster numbers, and presents the user with two performance indices.

Big data analytics along with data mining tools can uplift the prediction to enhance the Agro-Economy. Big data in agriculture has immense potential to produce more with less as the decrease in texture with rapidly increasing population has become a pattern of serious concern [12]. Technology used with agricultural data helps to transform the crop yield production even if there are various ther factors affecting it like weather, soil, pests etc.

Data analytics and ML help the machine gather data and and learn the data by neural networks. This further helps the system learn and implement the data for analysing and predicting the outcomes. The patterns that are recurring in the data are reflected and this makes it easier for the agriculturists and farmers to improve on these patterns. The relationship between the patterns and crop growth can be plotted out further helping develop and increase the per square km crop output[14]. The metrics and criteria usedfor crop like temperature, soil density etc affect the crops significantly. Neural Networks(ANN), SVM regression and logistic regressions models can be used.

B. Data Analytics for Innovation and Yield

An online gateway was built by John Deere which helped to aggregate data from soil probes and sensors that were equipped on the John Deere agricultural equipment that were used to capture information as an equipment and machinery move on how farmers could use data effectively [1] . Various data was added by the company from a variety of sources, eg- neighboring farms, on site which provided many insights regarding production for various scenarios. Farmers were assisted in improving yields, planning and resource management by the critical information contained in the portal. Reduced nutrient misuse combined with sustainable intensification might boost maize, wheat, and rice yields by 30 percent, according to a study published in Nature.

C. Big Data for Soil Health Management

The Indian government in 2015, announced the Multipurpose National ID Card, with a goal of providing every farmer with the soil health card that would help them to get notified about the soil condition and its nutrients which would in turn help in fertilizer applications to help in maximal production. The entire government agricultural extension and research system rallied, collected various samples and analyzed around 12 soil components and recommended Soil Health Cards(SHCs) that were issued to farmers [1]. The project has collected 25.3 million samples and distributed SHCs to 107.4 million farmers, achieving its primary purpose.

Some of the Major Drawbacks were: Firstly, the system faced quite a few operational difficulties. Soil samples were gathered from every 2-square-hectare block of land from the irrigated areas and transferred to a dated network of wet chemistry labs for examination. This places a great deal of strain on the system and lowers the quality of soil analysis. In later studies, the results supplied by the SHC scheme and those generated by gold-standard labs have shown a low correlation.

Secondly, the current architecture of the scheme simplified nutrient recommendations. According to a study, the 'Yield Response' of a crop to nutrient was becoming exceedingly complex. Yield response has a alot of factors affecting it which includes rainfall, farming practices, acidity in the soil, nutrients present and temperature, to name a few. Onlya model that uses accurate data for the aforementioned parameters can forecast the correct yield response, which is something that the current method does not achieve.

Finally, the potential of the plan is undervalued because no other purpose is served other than filling up a physical card by the collection of large scale data. Researchers, State Governments and Start-ups have noticed a general cut from the hug reservoir of Data. It could prove helpful for start-ups as the combining of soil-health-card data with the rainfall and irrigation data by this information can prove beneficial to farmers and provide for precision agriculture via smartphones.

Although these were the few flaws noticed, they paved and presented an opportunity for Indian agriculture. It was predicted that the system may transition to a sampling- based soil-information system which would possibly help in eliminating the needs for tens of millions of samples, which were contributing to the burden on lab capacity but producing better results four times faster and half atthe cost. A proposal was also made for farmers to use a tailored fertilizer blend along with the act of encouragingthe farmer to minimize the sowing depth. It is also predicted that fertilizer companies will bring in usage of soil data, meteorological data and farmer demand trends to modify the fertilizer blend distribution in different districts if a platform was built on top of it. It is predicted that such a platform might spark a surge of agricultural innovation.

VIII. PROBLEMS WITH EXISTING AGRICULTURE

Out of India's total population, over 68 percent live in rural areas, and about three-fourth of the residents of these rural areas are heavily dependent on agriculture for their living. Some critical issues were pointed out by the Mr. Gopal Naik, in one of his interviews, was a professor in the domainof economics and social sciences who also happened to be Chairperson for the Center for Public Policy at Indian Institute of Management, Bangalore [2] .The current issues that hamper Indian agriculture mainly include the deficiency of proper knowledge and infrastructure in rural areas. Irrigation, market, and transportation infrastructure issues all add major costs to farmers' businesses. A lack of delivery systems is also a problem.

A lot of programs are in place to help develop agriculture. We lack effective delivery systems that can transform these into effective facilitation on the ground, whether it's in terms of increasing productivity, lowering costs, or increasing price realization. These problems are exacerbated by a lack of government support.

One of the major concerns in agriculture is Government failure because help and facilitation is made necessary because of the high risks. Agriculture in general is subjected to a variety of risks like any other business enterprise because of the number of factors involved along with their volatile nature. One example could be weather which could cause a problem, that is droughts or heavy rains throughout the years with respect to different years. This is true for any place in the world but there may be a different degree of intervention that is in countries like the US, Canada and European Union, there is extensive intervention by the government. Facilitation by the government is key to a good agricultural development.

IX. PROBLEMS IN IMPLEMENTING BIG DATA ANALYTICS WITH AGRICULTURE

'Big Data', the term has been in use since 2005. Data and smart systems can help in growth in the agriculture sector. It brings a change in the agrarian practices varying from cultivation to earthenware casing for various products. Big Data is still a controversial concept in the agricultural industry, owing to the difficulties that accompany its implementation. Data governance, sequestration, security, sharing, cost, and data power are just a few of the difficulties.

A. Data governance

Peritt's analysis shows that it's critical to break down technological barriers that obstruct data communication and sharing. It's been argued that Big data may contribute to huge revenge as there are a variety of challenges it faces from the five V's. In order to land accurate and practical data, regular data chops are required for better handling of the data- mining system. Based on the exploration in India, Sekhar etal. concluded that people rely on civilization because of their ignorance, which confines them to contemporary civilizational styles.

B. Privacy

Moorthy et al. has previously discussed sequestration difficulties in Big Data. It is believed that it is necessary for the development of new ways to deal with these issues. A note of the marketers interest was made and it showed that the main areas were that of consumer sequestration, collection of particular data and its application. Enterprises were raised by carbonell about how manufacturers such as John Deere, DuPont and Monsanto were easily able to get information brokers and how they fixated on the misuseand exploitation of patents evolving towards an unequaled collection of husbandry data regarding the sequestration in data analytics.

C. Security

From the public perspective, one of the major motivators for further technological advancements is food security. It was stated by Tong et al. that consumers are focussing more about the various nutritive aspects of food, health and wellbeing. Perfection husbandry "The Holy Grail" was aterm coined by Wolfert etal. that would contribute to the addressing of imbalance in food force and demand.

D. Sharing

Data analytics serves as a key tool in managing potentially sensitive data in a secure manner and it makes it simpler in achieving it. It's also necessary that while developing a platform, it's important to consider the counter accusations of the technological changes and the maintenance ofd the confidentiality of data.

E. Expense

Big Data is a trending technology not only in India but in the entire world. With that comes the expense of it. It is costly. In order to store or transfer 1GB of data in the cloud on Amazon AWS or Google suite is expensive. Also, additional investments are brought by offline computation of software packages and hardware.

F. Data ownership

The enemies of centralization and standardization in any organization are due to the lack of power and freedom. Data ownership is affected by the lack of autonomy which inturn brings about its effect in cost and benefits structures. Pruscino and Shores developed a technology which allowed one to assign and to change the ownership for a particularset of data in a database in order to overcome the limita-tions as mentioned above. Aside from the aforementioned obstacles, sentimental feelings also play a role in adopting modern technology. Most farmers in India, bring a changein their farming practices based on advice given by friends or relatives. A major factor that comes when talking about change is budget. Smart technology or Big data is still at a very beginning stage in India, the difficulties are brought about by the cost required to adopt that technology. Also, Indians are extremely sentimental for their ancestral lands and the majority of them wouldn't alter or replace the farming equipment.

X. BIG DATA IN MODERN WORLD

Big data nowadays is the upcoming technology widely used in all the sectors. The agricultural sector uses big datato get information about the crops. Big data helps farmersto analyze huge amounts of data and keep it segregatedand sorted for further use. Since the agricultural businessis expanding on a huge scale, maintaining the data is te- dious and time consuming. Data from social media, network channels of suppliers, machine generated data etc are all examples of big data in this field. As a result of these data the agricultural sector is taking new turns and is achieving new prospects.inference drawn that farming can be aggressive in the future and it could be concentrated heavily on research and market driven. The WTO agreement have created new opportunities for developing countries' agriculture, but they have also created new threats. Innovation is fairly limited to developing nations and the momentum has been majorly picked up by developing nations like India. One of the issues in India is the small farm size [16].

XI. FUTURE SCOPE

As we can see today the nature of data around is extremely dynamic and prone to changes.the data collected most of the times is redundant or not usable. This data needs to be converted into useful information and stored in a structured way for us to use and implement its conclusions and outcomes obtained. today big organizations use big data regularly as a result of which it needs to be regularised and structured with accordance to the user's privacy policies. governments today need to make sure that the rights of the citizens are being protected and no illegal collection and gathering of data is taking place. today the size of the data is huge and it just showcases how much data is being generated on a daily basis and its requirement in today's world. The multiple reports generated from in numerous data collection methodologies (which are also to be enforced using standard ways and available tools). Pertaining to the specified disciplines given in the papers we need to dissect and understand how the current exploration will be impacting the unborn labors for data analysts of tomorrow. Enhancing the datasets and perfecting the accuracy is a major concern till date. Given any sphere in the agrarian sector addressed in the papers the performing affair have been practical results with reasonable downsides which can be divided in unborn papers or repetitions of the current papers. Nonetheless, perfecting the quality of the results by decimal accuracy will be concerning the future generations.Predictive data analysis technology is the basic use of Big Data which helps in processing the agriculture related data thereby coming up with smarter and intelligent information and it is often integrated with various stages of farming to inhibit the risks thereby increasing efficiency of farm production and supply chain in the agricultural sector. Recent advancements have ushered in a new era for agricultural activities, which has in turn helped the farming industry to reach maximal productivity and prevent risks through predictive data analytics [16].

XII. CONCLUSION

As we can see that today technology plays a vitalrole in agricultural activities, as a result there is humon-gous improvements are observed with respect to productivity(depending on its domains).The modern creations of humanity i.e our today's technological advancements have lead us to normalising multiple aspects concerning agricultural sub activities. These include digitisation of monitoring husbandry with new lens. Some examples of these innovations are smart husbandry, digital husbandry, perfection husbandry, IoT in agriculture etc. We can observe that today the analysis that has been on multiple samples of soil collected , multiple hidden patterns have emerged and are still till date being discovered which are helping the farmers use the right type of materials such as pesticides,insecticides,compost etc. Other than soil patterns climate conditions have also been observed. Based on these data sets collected new ways of harvesting has emerged benefiting the farmers and relevant stakeholders. Other relevant data sets such as seed quality,temperatureetc. have also contributed greatly in increasing the profits

margins and yield quality of the crops. The influence on the quality of the crop has been affected not only on agrarian fields, there are numerous other parameters like downfall auguring, soil quality assessment, seeds selection, crop yield vaccination etc. apart from these parameters mentioned here there are other multiple parameters which can be taken into consideration . The total values that are obtained from these analysis followed by the study of the data further still require much more data and the factors affecting the improvement of the current technology for future agriculture needs which are yet to be discovered.

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