Notice of the Central Cyberspace Affairs Commission and Ministry of Agriculture and Rural Affairs Information Commission on the Development Plan for Digital Agriculture and Rural Areas (2019-2025)

Agricultural Plan [2019] No. 33

All provinces, autonomous regions, directly-administered municipalities, and cities specifically designated in the state plan agricultural and rural (agriculture and animal husbandry) offices (commissions and branch offices), Internet Information Office, Xinjiang Production and Construction Corps Agricultural and Rural Bureau, Internet Information Office:

In order to implement the Opinions of the CPC Central Committee and the State Council on Implementing the Rural Revitalization Strategy, the Strategic Plan for Rural Revitalization (2018-2022) and the Outline of Digital Rural Development Strategy; and to accelerate development of precision agriculture and rural production and administration, smart management services, and rural government digitization: Central Cyberspace Affairs Commission and Ministry of Agriculture and Rural is hereby sending you this Development Plan for Digital Agriculture and Rural Areas (2019-2025) for thorough and serious implementation.

Ministry of Agriculture and Rural Affairs Central Cyberspace Affairs Commission
Wednesday, December 25, 2019

Development Plan for Digital Agriculture and Rural Areas

(2019-2025)

December 2019

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This Plan is prepared to implement the Opinions of the CPC Central Committee and the State Council on Implementing the Rural Revitalization Strategy, the Strategic Plan for Rural Revitalization (2018-2022) and the Outline of Digital Rural Development Strategy; and to accelerate development of precision agriculture and rural production and administration, smart management services, and rural government digitization:

I. Developmental Trend

(1) Developmental Results

The Central Committee of the Chinese Communist Party and the State Council have attached increased importance since the 18th National Congress to establishing digital agriculture in rural areas, and thus have prepared a major comprehensive plan with components that include strategic big data implementation, strategy for rural digital transformation, and fostering "Internet+" agricultural modernization. Government agencies and local administrations nationwide have achieved stunning results by fostering and promoting digital technology implementations for rural agriculture.

Digital technologies and accelerating its integration with rural agriculture. The industry is rapidly digitizing, and digital technology such as intelligent sensors, intelligent analytics, and intelligent control are penetrating rural agriculture more rapidly. Rural agriculture big data development is deepening, and there have been gradual improvements in market monitoring and early warning programs. Platforms have been set up to enable agricultural product quality and safety traceability, fundamental agricultural and veterinary drug data, key agricultural product market information, and direct information reporting on new agricultural operators. Single-type big data development is underway, with promising early results in seed producer big data and agricultural technology services.

New industries and models are emerging. Agricultural product e-commerce is booming. Agricultural products' national online retail sales reached 554.2 billion Yuan in 2018, accounting for 9.8% if all agricultural product sales. Agricultural products e-commerce and remote sensor big data service offerings are constantly being enriched and digital innovation is developing in lockstep with innovation. Rising new business models include agricultural customization, agricultural innovation, livestock securitization, and farms in the cloud. The rural sharing economy is emerging while Internet+ social services are rolling out.

The digital agriculture share will account for 7.3% of all added value in agriculture by 2018.

Continuous improvements in technological innovation capability. The National Engineering Technology Research Center in the Field of Digital Agriculture, the Agricultural Information Technology and Agricultural Remote Sensing Discipline Group, and the National Intelligent Agricultural Innovation Alliance have been set up. Construction of smart agricultural laboratories and digital agricultural innovation centers has accelerated, and related specialties such as the Internet of Things in agriculture, data science, artificial intelligence have been established in higher learning institutions. Development of digital agriculture standards is accelerating, wherein the agricultural Internet of Things, sensory data descriptions, and basic specifications for sensors are being released. Research, development, and application of sensors, UAVs (drones), agricultural drones, and other independently patented technologies, in addition to agricultural data collection technologies integrated with remote satellite based sensors, remote aircraft mounted sensors, and ground based Internet of Things technologies are maturing every day. An agricultural machinery operations monitoring technology utilizing Beidou satellite automated navigation achieved a breakthrough and is now widely used in wheat harvesting.

Infrastructure and equipment deployment has improved considerably. Over 98% of villages now have fiber optic connections or 4G, achieving the 13th Five-Year Plan targets ahead of schedule, with 94% of low-income villages connected to broadband internet. There are 29.2 computers and 246.1 mobile phones per 100 households in rural areas. Initial work has been

done on a program to utilize agricultural remote sensing and navigation & communication satellites with the launch of the Gaofen 6 high-resolution imaging satellite that has agricultural observation capabilities. IoT-capable monitors are being increasingly applied to subsoiling and soil preparation for agricultural machinery, now exceeding 900 million acres.

Initial policy support program development. The 13th Five-Year Plan for the Development of Agricultural and Rural Informatization, the Three-Year Plan for the Implementation of Internet+ Modern Agriculture, and the Implementation Opinions on the Development of Agricultural and Rural Big Data were issued. An initial digital agriculture and rural construction policy program has been established.

26 provinces are covered by the Village Informatization project, and one-third of the administered villages in the country have set up Yinong Information Offices. We developed replicable models by fostering the digital agriculture development pilot project, rural agriculture big data pilot project, and the national Internet of Things utilization demonstration project. Local governments have issued a set of supporting policies as needed locally, to foster smart agricultural production and the new model of internet marketing and informatized information management.

(2) Opportunities and challenges for development

The digitization in agriculture and rural areas encompasses revolutionary change in digitization of agricultural factors, including biological and environmental factors, agricultural processes such as production, operations, management, and rural governance. Looking forward, the future development of digitization in rural areas and agriculture will embrace hard-won opportunities. A global technological and industrial revolution is underway. The application of Internet of Things, Internet of Intelligence, Big Data, Cloud Computing and other new generation information technologies will be accelerated. This has profoundly altered life style and production patterns, triggering fundamental changes to the economy and industry, and a new digital economic consensus will emerge. Big data is now a fundamental strategic resource behind an innovation engine driven by a new generation of artificial intelligence. Digital agriculture is now a strategic focus for the developed world. To build advantage of the new industrial revolution, we have issued strategies such as The Big Data Research and Development Plan, The Agricultural Technology Strategy, and The Agricultural Development 4.0 Framework. In China, the CPC Central Committee and the State Council value network security and information technology. Vigorously promote the construction of digital China, implement the digital countryside strategy, accelerate the process of 5G network construction, and provide a strong policy guarantee for the development of digital technologies in agriculture and rural areas. Information technology is developing in lockstep with new modernization in industry, cities, and the countryside. The urban-rural digital gap is being quickly closed, and an inclusive digital technology is driving the digitization of agriculture and rural development.

Deep implementation of rural revitalization has moved Chinese agriculture into a high-quality developmental phase. Development model transformation has been accelerated for agriculture and rural development with development structure optimization, and growth incentive transformation; create space for agricultural and countryside producers and managers to digitize.

We can nonetheless see that the comprehensive development of digital technologies in agriculture and rural areas is lagging and faces numerous challenges. The foundation for development is weak with limited data resources. Space/Aerial/Ground data collection integration capabilities are weak, with low coverage. Big data for the entire industrial supply chain of key agricultural products and fundamental data resources for agriculture and rural areas is in its early stages. We lack innovation capabilities, lag in R&D of essential technologies, have a shortfall in agricultural sensors, and our agricultural robot and smart agricultural machinery is not highly adaptable. The application of digital research in agriculture and rural areas is backwards especially when compared with fields such as medicine. Digitized administration in

rural areas is too low compared with urban areas. Digitized production is lagging due to inadequate data integration, sharing, development, and utilization; the share of agriculture in the digital economy is lower than the industrial and service sectors. These are all weak links in the enterprise of a digital China.

We have determined that we must keep up with the times and seize the strategic developmental opportunities provided by the current and 14th Five-year Plan phases for fostering digitization in agriculture and rural areas and: accelerate the spread of digital technology applications and foster digitized production; seize the commanding heights for digital technological development in agriculture and rural areas; promote high-quality agriculture's development and rural revitalization; and make all farmers stakeholders in the digital economy.

II. Overall Ideas

(1) Guiding ideology

Guided by Xi Jinping's new era of socialism with Chinese characteristics, we will fully implement the spirit of the 19th CPC National Congress and the Second, Third and Fourth Plenary Sessions of the 19th CPC Central Committee. We shall implement the comprehensive plans for the Digital China Strategy, Rural Revitalization Strategy, and Digital Countryside Strategy and: treat production digitization and digitized production as the main avenue for development; realize these goals by achieving deep integration of digital technology in rural agriculture; build a fundamental data resource program using data as the key factor of production; improve digital production capabilities; accelerate the digital transformation of rural agriculture and its operations and management; increase innovation in key technologies and construction of major infrastructure projects; foster connections and sharing between government information systems and public data; comprehensively improve rural agriculture smart production capabilities, management networking, and the convenience of services; and finally, use digital guidance to drive rural agriculture modernization and firmly support comprehensive rural revitalization.

(2) Fundamental Principles

-- Comprehensive planning for orderly progress. Confront the challenges of the agricultural modernization enterprise by utilizing new trends in the digital economy and information technology. Gradually attain key breakthroughs in exploring distinctively Chinese rural agricultural development model by improving a top-level design that distinguishes local conditions.

-- Inclusive data-driven sharing. Promote data integration, mining, and applications by developing a sharing platform to integrate resources and share data and thus: achieve rural agriculture data connectivity, resource sharing, and business collaboration; create new normal for digital agricultural industries and models; and enable farmers to have a sense of accomplishment and well-being.

-- Innovation and application orientations. Face up to the core needs of rural agriculture by focusing on must-have rural agriculture technologies to: foster independent innovation and breakthroughs; improve pilot projects and integrated applications; and enhance smart agricultural production and management by modernizing rural governance.

-- Broad participation in joint efforts. Optimize the mechanisms for promoting government guidance, market leadership, and social participation to: fully utilize internet and agricultural information businesses; encourage broad participation by farmers and new agriculture operators; and establish diverse participation in development for the common good.

(3) Development goals

Major accomplishments to support the Digital Countryside Strategy will be made by 2025 in

the expansion of digital technologies in agriculture and rural areas. The data collection system for agriculture and rural areas will be in place with the groundwork for the: Space/Aerial/Ground observation network, fundamental data resources as well as the cloud platform for agriculture and rural development. Accelerate integration of digital technology with the industrial, production and management systems in agriculture, thus: making significant progress in digitally transforming agricultural production and management; markedly improving digital proficiencies among administrators; substantially increasing the share of digital agriculture; and making the rural digital governance system better day by day.

Primary Metrics for Digital Rural Agriculture Development

Metric	2018	2025	Annual growth (%)	Type
1. The share of digital agriculture of all added value (%)	7.3	15	10.8	Forecast
2. The share of net agricultural product retail sales over turnover of all agricultural products (%)	9.8	15	5.5	Forecast
3. Rural penetration rate of internet (%)	38.4	70	10.5	Forecast

III. Setting up a fundamental data resource program

(1) Building natural resources data for agriculture

Provide exploitable big data on parcel land title, metes and bounds, quality, and cultivation type by utilizing data resources including: rural land contractor management right order recordation; perpetual basic farmland platting stored on high detail maps; arable land quality surveys and monitoring; designate food production areas and agricultural production protection areas; data such as infrastructure on agricultural purpose land; and set up a database containing fundamental information on arable land.

Establish exploitable big data on both domestic and global inland and ocean fishery resources by surveying the spatial distribution of fishery waters, boards, ports, and navigational aids.

(2) Set up data resources on important agricultural germplasm

Rely on a unified national germplasm industry big data platform to: develop a national database on important germplasm resources; prepare a map of nationwide agricultural germplasm resource facility distributions; and foster dynamic digital germplasm resource monitoring and informatized administration for crops, livestock, poultry, aquaculture, and microorganisms. Explore high-quality germplasm and genetics by accurately identifying and evaluating plant and animal phenotypes and genotypes. Set up a molecular fingerprinting database to support variety selection, in addition to industrial development and regulation through big data applications.

(3) Build big data on shared rural assets

Promote information digitization for shared rural assets by setting up electronic ledgers recording the registration, storage, use, and disposal of shared assets. Build nationwide rural shared asset data by collecting data on verified holdings, property reform, agricultural co-op entity registration codes, and shared assets financial management. Improve oversight of state-owned agricultural assets' possession, use, revenues, and disposal.

(4) Build rural homestead data

Build a national rural homestead database, covering homestead units, spatial distribution, area, ownership, restrictions and utilization status by integrating the third national land survey,

remote satellite remote sensing, combined with real property data on of homestead certificate of title, and the rural homestead & rural housing utilization status survey. Quickly optimize and update fundamental data by fostering informatization in homestead distribution, approvals, transfers, utilization, regulation, and statistical reviews.

(5) Improving big data on farmers and new agricultural businesses

Gradually achieve full coverage of agricultural businesses and dynamic production and business information to optimize fundamental data on business identification, employment, production management, subsidy distribution, regulation and inspection, use of inputs, training, and marketing. In doing so, utilize registration databases on contractor usage rights for rural land; integrate this with systems such as agricultural subsidy distribution, inputs oversight, agricultural operator direct reporting, and a list of family farms; and apply the methodology of unified ministerial planning, one-time reporting by agricultural operators, and diverse stakeholder buy-in.

IV. Accelerate digital transformation in production operations

(1) The informatization of planting

Accelerate the digital transformation of agricultural reports by utilizing satellite and aerial imaging with the ground based internet-of-things to dynamically monitor planting types and areas, soil moisture, crop growth, in addition to disasters and major infestations. Promptly distribute warning information to improve planters' informatized planting production management capabilities. Achieve intelligent identification of major pests and diseases and digitized prevention to accelerate the establishment of the agricultural pest monitoring network and digital plant protection program. Build the digital countryside by: fostering integrated field planting application of smart sensors, analytics, controls, and equipment; setting up environmental controls, precision water & fertilizer use, precision planting, smart operations and dispatch for agricultural machinery; develop smart Workshop Agriculture; and foster smart management for crop production operations.

(2) Smart livestock management

Build digital livestock facilities by: fostering smart livestock equipment improvement for ventilation and temperature control, air filters, and environmental sensors; integrating applications of digital equipment such as electronic identification, precision feeding, and livestock manure treatment; precision monitoring of livestock breeding inputs and outputs; and achieving livestock breeding monitoring and precision feeding. Improve accurate diagnosis, early warning, prevention, and control of animal epidemics by accelerating deployment of smart monitoring technology at the individual level. Foster direct farm data reporting (slaughter, feed, and veterinary) by establishing a "one number per facility (entity), one standard per animal (bird) standard"; and achieving information interconnection at all stages including production, circulation, and slaughter. Speed up setup of a digital dairy cloud platform.

(III) Smart fisheries

Establish an aquaculture production management system using the Internet of Things to foster smart aquaculture. Foster widespread use of digital technology and equipment such as real-time monitoring of water environment, precision baiting, disease monitoring and early warning, water circulation equipment control, automating caging, drone autopilot, and develop digitized fishing areas. Foster development of smart informatized ocean visualization systems in the maritime "pasture" demonstration area. Foster the application of the Beidou navigation and Tiantong communication satellite communications in maritime fishing by: accelerating the development of digital communication base stations; and upgrading and retrofit shipboard devices and digitized fishing equipment with satellite communications, positional navigation, and collision prevention. Improve fundamental research on offshore fishing digital technologies to: enhance pelagic fishery resource information collection and analytical capabilities, and foster

utilization of deep water fishing boat video monitoring.
Develop the fishery internet by promoting intelligent navigation, operation and control of fishing vessels, and build a comprehensive fishing port management system that covers fishery administration enforcement, fishing vessel entry and exit reports, electronic fishing logs, traceability of catches, dynamic monitoring of fishing vessels, and video monitoring of fishing ports.

(4) Seed industry digitization

Accelerate research and development and deep big data applications in the seed industry by: developing information collection, multidimensional analysis, and smart evaluation models; carrying out smart data mining and analysis across the entire seed industry research, production, and management chain; and building an intelligent service platform. Research animal and plant phenotype information collection technologies as needed by commercial plant and animal breeders, thus achieving high volume acquisition of big data on phenotypes. Expand resource identification for development by providing support for deep data mining in genetics by establishing a genetics and phenotype database for a variety of resources. Integrate smart digital breeding support platforms with data mining on genetics, proteomics, and phenytypes by: designing optimized breeding plans for desired traits; and accelerating the shift in mentalities from using personal experience in breeding to using precision decision making to gradually achieve custom design breeding. Comprehensively utilize production permits and Space/Aerial/Ground monitoring methods by: accelerating digital technology applications for supervising seed production, livestock, poultry, and rice-fish culture; and by improving smart oversight of the seed industry. Horizontally connect databases to provide one-stop search and service for data, technology, services, policies, and laws, and optimize the seed industry big data platform mobile phone app, thus fostering innovation in seed industry service models.

(5) Diversifying new approaches

Encourage agriculture crowdfunding, custom agriculture, and other new Internet based approaches, and innovative development in internet management based approaches such as shared agriculture and cloud farming. Enhance comprehensive demonstrations of rural e-commerce by: implementing the Internet+ farm-to-market project, fostering AI and big data empowerment of rural brick and mortar stores, and connecting online and offline marketing channels for agricultural products.

Encourage development of smart agriculture recreation platforms by: optimize digital recreational agriculture maps; providing guidance to rural tourism pilot project countries and Beautiful Holiday Villages (fishing villages and farms) on how to operate online; and promote public participation in evaluations, digital touring, and immersive experiences. Foster data industry across industries and fields and service expansion, thus deepening the development and utilization of data resources on agricultural production, market transactions, agricultural inputs. Innovate in service models such as supply/demand analysis, technological promotion, and product marketing, by promoting big data for business models such as lending, insurance, and supply chain finance.

(6) Start-to-finish quality and safety controls

Foster agricultural production standardization by establishing essential agricultural product standards such as classification and grading standards and promoting the development of standardized agricultural product informatization across the entire supply chain. Foster agricultural project labeling practices by providing guidance to producers and operators on how to prepare labeling of quality certification, commodity origin, trademark, and branding. Foster agricultural product traceability by: optimizing the national government's platform information platform for agricultural product quality and safety administration; setting up a certification system for edible agricultural products; fostering informatized agricultural product quality and safety oversight; and setting up joint action mechanisms for traceability management and risk

warning & emergency recalls. Improve the agricultural capital recordation and administration ledger system by providing wide access among farmers to purchasing cards for agricultural capital. Establish an inputs traceability and data collection mechanism for county-level oversight by collecting production management data, in addition to seeds (seedlings, livestock, and poultry), pesticides, fertilizers, feed, and veterinary medicines.

V. Foster a digital transformation in digital management services

(1) Establish a technically advanced robust rural agriculture decision-making program

In order to make macro-management more scientific by fostering online-offline management service integrations and advance data synergies and work collaboration, build a rural agriculture big data platform based on the rural agriculture fundamental data resource program, comprising: building a knowledge base and model base by utilizing big data analysis, mining, and visualization; developing functional modules such as planting, animal husbandry and veterinary medicine, fishery management, oversight and management, science education, resources and the environment, international cooperation, government administration, statistical reporting and rural social services; and providing support services for market early warning, policy evaluation, oversight and law enforcement, resource management, public opinion analysis, rural governance and other decision-making.

(2) Complete the monitoring and early warning program along the entire agricultural product supply chain 16

Enhance production and market monitoring for agricultural products by: enhancing real time production data collection and monitoring; encouraging electronic payments for farmers' market and wholesale market sales; foster real-time collection and connection of key market transactions, including those for agricultural products at wholesale markets, supermarkets, and on e-commerce platforms; and building big data on agricultural products markets that integrates traders, varieties, volumes, and prices. Develop and utilize global agricultural production and trade data to build a system to survey and analyze global agricultural data. Optimize agricultural product information collection systems for businesses investing internationally or overseas. Improve early monitoring and warning information for agriculture by: expanding and enhancing information distribution and services for daily agriculture product market prices, monthly/quarterly supply & demand analysis, the balance sheet of supply and demand of important agricultural products, and medium and long-term agricultural forecasts. Develop the rural agriculture economic operations subprogram as part of building the rural agriculture modernization monitoring and evaluation program. Improve analysis of agriculture sector resource utilization in global markets by institutionalizing analysis of agricultural internationalization operations.

(3) Build a digital service program for rural agriculture

Fully implement rural household informatization by: optimizing upgraded online service for rural communities; speed up set up of the Yining Information Offices; and optimize social services management.

Optimize the agricultural science and technology service platform by encouraging agriculture experts to provide solutions to production problems online. Provide guidance to individuals on how to use information technology to facilitate agricultural production work in market information, supply of agricultural materials, resource utilization of waste, agricultural machinery operations, primary processing of agricultural products, and tailored agro-meteorological solutions, thus providing the benefits of public interest service and operational services to the general population. Collect management statistics such as how much agricultural machinery and equipment is owned in addition to agricultural operations time utilization data, thus improving online monitoring and information services on agricultural machinery. Improve closely related agricultural innovation big data development and collection such as international

and domestic technical innovation on big data, in order to foster integrated management of agricultural science and technology publication big data, agriculture science big data, and agriculture research. Build a number of innovation centers for farmers to: hold online exhibitions and trade shows for agricultural products, rural handicrafts, rural tourism, and home stay catering; and collect and push real time employment and entrepreneurial data for rural workers.

(4) Establish a smart environmental monitoring program for rural residents

Perform thorough surveys and regular monitoring integrated with measures to improve the residential environment by collecting relevant data resources, and setting up a database on rural residential areas. Institutionalize long-term fixed monitoring of agricultural wastes such as straw, agricultural film, and livestock and poultry manure, by studying and fostering remote monitoring of water resources, large-scale plant breeding, rural household waste disposal sites, and agricultural waste disposal sites. Encourage development of new services such as data mining and business analytics for rural residential areas. Provide guidance to farmers on how to actively participate in internet based monitoring of rural residential areas and work together to protect the green residential environment.

(5) Build a rural digital governance program

Foster extension of the Internet+ community into the rural areas by: informatizing comprehensive services at the village level; and gradually implementing online operations village-level administrative work such as information distribution, citizen surveys, consultative discussion, and public services. Accelerate informatizing rural planning and administration to foster rural map indexing, lookup, and real-time tracking. Improve online management of rural infrastructure development and rural public services.

VI. Increase innovation of essential technologies and equipment

(1) Enhance research into essential general purpose technologies

Make advances in high-quality, high-precision, high-reliability, low-power consumption sensors for the agricultural production environment and plant and animal physiology with a focus on rural agricultural modernization and rural revitalization. Provide solutions to the root of challenges in obtaining high-throughput information for digital agriculture. Make breakthroughs in new knowledge service technologies such as agricultural big data integration and governance technology, agricultural information intelligent analysis and decision-making technology, cloud service technology, and smart information push and Q&A services for agriculture. Develop models for regulating plant and animal growth information acquisition and production. Ensure agricultural machinery operations information awareness, quantitative decision making, smart control, precision investment, and personalized services by making breakthroughs in essential equipment technology such as special sensors for agricultural machinery equipment, agricultural machinery navigation and automation, precision operations and intelligent operation, and maintenance management of agricultural machinery, and by fostering integrated research and systemic demonstrations of agricultural machinery, agronomy, and information technology. Research and develop rapid quality and safety analysis and detection, and cold chain logistics technology, in order to promote applications of quality fission detection, automating grading and packing lines for agricultural products, and smart temperature control systems.

(2) Improve Advanced Strategic Planning for Cutting Edge Technologies

Draw up a road map for the development of digital agriculture technology leading to the frontier of world technology and science to meet the nation’s major demands and core digital rural agriculture development, in order to make advanced plans for frontier and disruptive technologies and make important breakthroughs in fundamental and general technologies in the field of digital rural agriculture.

Establish a support mechanism for scientific and technological innovation that integrates long-term task delegation with dynamic adjustment for task phases, by: increasing basic R&D and

advanced planning into flexible processing of agricultural products, artificial intelligence, virtual reality and big data cognitive analysis, thus making available technological and product reserves for digital agriculture. Establish a scientific program and innovation network to support cutting-edge technology research, thus increasing industrial-academic research coordination to consolidate a first-mover advantage and high-end leadership. Accelerate breakthroughs in essential technologies such as large-scale agricultural blockchain networks and on-chain/off-chain data coordination to: increase agricultural blockchain research, thus fostering innovative applications of block chain technology in agricultural resources monitoring, quality and safety traceability, rural financial insurance, and supply chain transparency. Proactively carry out research on 5G technology applications in agriculture, and set up and optimize a smart agriculture technology program driven by 5G.

(3) Improving Technology Integrated Implementation and Demonstrations

Focus on key areas, fields and varieties, to implement 3S technology, intelligent sensors, model simulation, and intelligent control, along with software and hardware products for integrated applications and demonstration; thus, growing and improving digital rural agriculture technology and best practice cases. Increase digital rural agriculture science innovation, along with platform integration and service. Improve the development of the digital rural agriculture standard system and establish standards for data, data access and services, software and hardware interfaces, and other common standards.

(4) Accelerate the Development and Implementation Artificial Intelligence in Agriculture

Implementing an agricultural robot development strategy by: researching and developing a new generation of highly adaptable, cost effective agricultural robots with AI decision-making abilities; and by accelerating the development of standardization and industrialization. Make key technology and product breakthroughs with a focus on achieving motion control, position sensing, manipulator control, and other key technologies.

Adapt to different crops and operating environments, by developing both universal and specialized robots for grafting, cutting, transplanting, and sowing. Develop auxiliary robots for highly efficient and automated livestock production processes such as grazing, feeding, milking, grading, monitoring, and moving objects. Develop aquaculture robots for fish tracking, feeding, and disease diagnosis. Strengthen the integrated implementation and demonstration of UAVs (drones), focus on overcoming UAV (drone) visual technology challenges by: fostering transformation from single machine intelligence to cluster intelligence; and investing in R&D of AI-enabled devices capable of real-time crop protection, aerial photography, field inspection, and quality inspection.

VII. Increase Major Infrastructure Construction Projects

(1) National Rural Agricultural Big Data Center Construction Project

Following the requirements set forth in the State Council Circular for the Approval of Big Data Development the Modern Agriculture Big Data Project, develop a unified and open national rural agricultural big data center in order to achieve data resource sharing, smart early warning analysis, and to improve management and scientific decision-making capabilities in rural agricultural areas.

1. National Rural Agricultural Cloud Platform. Focus on improving storage capabilities for rural agricultural big data and government administration, systems by developing a national rural agricultural cloud serving the country's central, provincial, city, and county levels. Lease and utilize the public cloud infrastructure, by developing a rural agricultural big data open cloud, and collect specific data from various industries and fields. Integrate existing hardware resources and optimize information networks, servers, and other facilities and equipment in order to develop a cloud for rural agricultural big data capable of storing essential data. Follow uniform standards for data sharing, convergence, and operational analysis to create a rural data gathering hub that cuts across agencies, regions, and industries.

2. National rural agriculture big data platform

Increase the management capabilities for data resources in shared assets oversight, agricultural germplasm resources, and rural homesteads in coordination with agricultural and rural government agency data and information resources by: combining data from big farmers and new producers, big data from natural agricultural resources, important agricultural germplasm resources, rural collective assets, and rural homestead; and drawing a Single Map of national agricultural and rural data resources. Build a unified data convergence, governance, analysis, and decision-making platform to make available data monitoring and early warning, decision support, and display sharing to provide data support for agricultural and rural development.

3. National Rural Agricultural Government Administration System Apply the "six uniform programs" requirements (user management, access management, resource management, authorization management, process management and security audit) in accordance with the national government comprehensive plan on informatization to: Improve data support capabilities for global agricultural data surveys and analysis, comprehensive fishing port administration, agricultural mechanization management services, farmland construction monitoring and oversight, and coordinated innovation in agricultural and rural research, to build a uniform national rural agricultural government administration system. Establish a standardization program for developing government information systems, in addition to safety assurance programs and operation management programs, in order to advancing technical, data, and operational integration, thus providing support for rural agriculture operations management and scientific decision making.

(2) Rural Agriculture Aerial/ Ground Observation System Development Project

Follow the Aerial/Ground digital agriculture management system plans and decisions provided in the Opinions on Fostering Green Agriculture through Innovative Systems and Mechanisms published by the General Office of the Communist Party of China and the General Office of the State Council to: develop the network infrastructure necessary to support a rural agriculture Space/Aerial/Ground observation system, along with its application system; thereby achieving the comprehensive, real-time dynamic observation of every field and every stage of agricultural production in rural environments

1. Space-Based Rural Agriculture Observation Network Development and Implementation Project

Focus on building new remote satellites and the ground-based infrastructure required to meet the needs of agricultural development by: leveraging existing and planned national space infrastructure remote sensing, navigation, communications satellite, and commercial satellite resources; implementing red edge multispectral imaging, wide-field hyperspectral imaging, radar, and other similar technologies to rural agriculture observation; creating networks of orbiting remote sensing satellites in a constellation of agricultural remote sensing satellites; forming agricultural space-based networks; and developing responsive agricultural remote sensing observation capabilities for routine monitoring.

2. Rural Agriculture Aerial Observation Network Development and Implementation Project

Meet rural agriculture demands for the high precision surveying and contingency monitoring of major agricultural emergencies and disasters by: focusing efforts on developing rural agriculture aerial monitoring networks made up of national and provincial centers branch offices; purchasing of advanced UAVs, such as long-endurance fixed-wing aircraft and highly-mobile multirotor aircraft, equipped with state-of-the-art sensors including specialized multispectral sensors, hyperspectral sensors, laser radar sensors, and terahertz sensors; developing UAV navigation flight control systems, operation monitoring systems, and data processing platforms suitable for Chinese agricultural production and specific to regional demands; and improving regional high-precision observation and rapid emergency response capabilities.

3. Agricultural Internet of Things Observation Network Development and Implementation

Project Aggregate and use agricultural remote sensing systems by: monitoring IoT data collection facilities in counties where remote sensing technology has been implemented, agricultural IoT experimentation and demonstration areas (sites), agricultural science observation and experimentation (monitoring) stations (sites), digital agriculture pilot counties, and modern agricultural parks; improving real-time ground observation and data collection capabilities and to optimize data analysis accuracy, this shall culminate in a unified, countrywide, ground-based rural agriculture IoT data surveying system.

(3) The Outline of Digital Countryside Development Strategy mandates the national digital rural agriculture innovation project accelerate the development of big data used throughout entire core agricultural product industrial supply chain and develop comprehensive digital rural agriculture service platforms.

1. National Digital Rural Agriculture Innovation Center Construction Project

Enhance independent innovation capabilities in digital rural agriculture by: acquiring key generic technologies; proactively preparing for frontier strategic technologies; implementing and demonstrating technology integration; developing agricultural AI applications; developing agricultural digital integration platforms; and establishing national innovation centers specialized in digital farming, digital husbandry, digital fisheries, digital seed industry, and digital agricultural machinery. Foster information-based farm management, smart husbandry, smart fishery, digital seed industry, and end-to-end quality and safety controls by constructing dedicated sub-centers specialized in: the farming of field crops such as rice, wheat, cotton, and potatoes, protected cultivation practices, orchards, poultry and eggs, beef cattle and sheep, dairy cattle freshwater aquaculture, offshore aquaculture, marine pastures, ocean fishing, crop breeding, animal breeding, tropical crops, and quality and safety traceability. Optimize specialized facilities and R&D bases and develop platforms for technological breakthroughs, equipment R&D, and system integration and innovation to boost the deep integration of digital technologies throughout agriculture industry.

2. Big Data Development Project for the Entire Key Agricultural Product Industrial Supply Chain

In order to improve production and operation decision-making capabilities and guide market expectations, seek out sophisticated industry leaders with sufficient technological capacity to develop big data for the entire agricultural supply industrial supply chain for different categories, including: wheat, rice, corn, beans, cotton, rapeseed, sugarcane, peanut, natural rubber, apples, citrus fruits, vegetable, potatoes, tea, broilers, poultry and eggs, live pigs, sheep, beef cattle, dairy cattle, fish, shrimp, crab, shellfish, and animal feed; develop data cleansing, mining, and analysis service models for production, processing, storage & transportation, sale, consumption, and trading; optimize key agricultural product market and industrial damage monitoring and early warning systems; and develop and provide production information, market prices, supply-demand balance, and other service products

3. Digital Agriculture Development Pilot Project

Improve the development of keystone data resources in important fields across counties by: developing a comprehensive information service system; optimizing every aspect of the general implementation and integration demonstration of digital technologies; and relying on county-level rural agriculture agencies, their affiliate organizations, or their subordinate government entities to develop several digital agriculture pilot projects in leading digital food production areas, key agricultural production protection zones, specialized agricultural zones, national green agricultural pilot development zones, national modern agriculture demonstration zones, and counties and cities having national modern agriculture industrial parks. Foster universal digital transformation in fields such as farming, husbandry, fisheries, and quality and safety oversight to explore replicable and scalable development models.

VIII. Oversight Policy

(1) Improve Organizational Leadership

Working within the National Digital Countryside Construction and Development Planning and Coordination System Framework, the Ministry of Agriculture and Rural Affairs, the Cyberspace Administration of China, and other appropriate agencies shall comprehensively promote digital rural agriculture development by; researching major policies, issues, and important work plans; and track and push forward the implementation of planned tasks. Optimize the link between policies and work coordination by establishing a system to implement the plans and advance the work. Local governments must draw up plans and implementation plans, as well as draft specific policies and measures based on local conditions to comprehensively foster the development of local digital rural agriculture. All levels of jurisdictional rural agriculture agencies must integrate the concept of digital agriculture into every stage of rural agriculture work to: accelerate the digitization of work processes and develop a management system for digital rural agriculture development. Rely on the Agricultural and Rural Informatization Expert Consultation Committee for additional guidance on digital rural agriculture development and expert support on decision-making processes and project implementation. Develop a monitoring and assessment system to regularly monitor rural agriculture informatization development.

(2) Improve Policy Support

Local governments must step up their digital rural agriculture development efforts and explore methods for purchasing services, collaborating with non-government entities, and offering interest subsidies specific loans in order to attract broad participation, as well as business and financial investment into the expansion of digital rural agriculture. Prioritize land allocation for major digital rural agriculture infrastructure development projects; additionally, subsidize specialized digital agriculture equipment and agricultural IoT equipment eligible for subsidies under the applicable regulations. Foster reforms to decentralize power, streamline administration, and optimize services in rural agriculture to upgrade management service processes and create a sustainable development environment. Actively support and expand rural agriculture industry digitization.

(3) Improve Data Collection Management

Create and optimize a rural agriculture data collection system by: consolidating and optimizing existing data monitoring and collection channels; upgrading the raw data collection, transmission, aggregation, management, and application infrastructures; and improving data mining, analyzing, and application capabilities. Make use of ground-based observation, sensor devices, remote sensing, and geo information technologies to collect real-time data on agricultural production environments, production facilities, and livestock and crop sensory data. Carry out Internet data mining by acquiring business and social data via government purchases to foster the integration of offline and online data. Actively combine different rural agricultural data resources in compliance with the law to achieve unified management and online data sharing via the rural agricultural data platform. Research and publish data sharing policies and management standards and create a list of rural agricultural data resource sharing directories to progressively foster data co-development and sharing among public entities, agricultural agencies, and central and local governments.

Speed up the collaborative management and integration of rural agricultural data resources, excluding data the government has deemed confidential, and gradually release such resources to the public.

(4) Improve Talent Support in Science and Technology

Create a digital rural agriculture technological innovation system by: focusing on supporting major national specialized and key R&D plans to achieve technological breakthroughs in digital rural agriculture; and setting up digital rural agriculture scientific innovation teams in the modern agricultural industrial technology system. Train and develop a group of leading talented people, engineers, and top-level management teams in the field of digital rural agriculture through joint

efforts between research institutes, higher education institutions, and business organizations. Improve digital rural agriculture business training by: enabling talented people to visit rural areas in order to: improve digital rural agriculture literacy, and enhance digital technology implementation and management capabilities for officials whose work involves rural areas, agriculture, and farmers, as well as new agricultural businesses, and educated farmers. Create a scientific performance review and incentive system to fully inspire and motivate talents.