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Law Monitoring: Rural and Agricultural Digitalization Development Plan of China 2019-2025

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I General Introduction

The Ministry of Agriculture and Rural Affairs and the Central Cyber Security and Information Committee of China jointly published the "Rural and Agricultural Digitalization Development Plan for 2019-2025" on December 25th, 2019 which will provide a blueprint for digitalization of agriculture and rural areas.

II Main Highlights

The "plan" outlines five important goals.

First, establish a basic data source system with a focus on natural agricultural resources, agricultural cropping, rural collective capital, rural housing, rural and new rural marketing integration as five main data points which will be the basis of rural development.

Second, improve the digitalization of production and sale, accelerate digitalization of cropping, animal husbandry, fishery and diversification of new industries, covering full process of quality control and improve digital agriculture productivity.

Third is to promote the digital transformation of management and services, establish and improve rural management decision-making support systems and early-warning systems for the entire industrial chain of important agricultural products, build a digital agricultural rural service system, an intelligent monitoring system for rural human settlements, and a digital rural governance system to promote rural governance.

Fourth is to strengthen key technology and innovation of equipment, strengthen key shareable technology research, strengthen strategic advanced technology and technology integration, applications and demonstrations, accelerate the development of agricultural artificial intelligence research development, and improve the leading role of the digital development.

Fifth, strengthen the construction of major engineering facilities, implement major national agricultural and rural big data centers, agricultural and rural aerial-ground integrated observation systems, and national digital agriculture and rural innovation, and other major engineering projects to enhance the support capacity of digital agriculture and rural development.

Current situation:

Digital and electronic sales of agricultural products: in 2018 total online sales of agricultural products in China amounted to 554.2 Billion Yuan which was 9.8% of the total agricultural sales. "Internet+" is gaining more popularity. The portion of digital agricultural economy is increased to 7.3% of total agricultural economy.

Infrastructure and equipment development: Nationwide coverage of optic cable and 4G reached above 98%, in poor rural areas broadband coverage exceeded 94%, in rural areas computer and mobile phone for per 100 households reached 29.2 and 246.1 respectively, "High resolution No 6" satellite for observation of agriculture successfully launched.

Basic principle: Overall planning and orderly execution; data driven and inclusive sharing; innovation-led, application oriented; multi-participating and common construction.

Development goal:

By 2025, significant progress would have been made in the construction of digital agriculture and rural areas, which strongly supports the implementation of the digital village strategy. The agricultural and rural data collection system will be well established, and the air-ground integrated observation network, agricultural and rural basic data resource system, and agricultural and rural cloud platform will be basically completed. The integration of digital technology with the agricultural industrial system, production system, and operating system would have been accelerated, significant progress would be made in the digital transformation of agricultural production and operation, the level of digital management services would be increased significantly, the proportion of the digital agricultural economy would be increased significantly, and the rural digital governance system would have been gradually improved.

Table: Main indices for digital agricultural and rural development

Index	2018	2025	Annual increase (%)	type
1.Portion of agricultural digital economy in total agriculture economy (%)	7.3	15	10.8	prospective
2.Online sales of agricultural products in total agricultural sales (%)	9.8	15	5.5	prospective
3. Rural internet coverage rate (%)	38.4	70	10.5	prospective

III Establish Basic Data Infrastructure:

1. Establish big data on agricultural *natural resources*: Utilize data such as registration of household responsibility land use rights and delimitation of permanent basic farmland, storage of high-standard farmland maps, investigation and monitoring of cultivated land quality, delineation of functional areas for grain production and protected areas for the production of important agricultural products , and facility agricultural land filing, etc. Establish a basic information database of cultivated land, with big data on land ownership, area, spatial distribution, quality, and planting types. Carry out surveys on the spatial distribution of fishery waters, fishing boats and fishing

ports, and fishery navigation marks to generate big data on fishery water resources covering inland waters and important global seas and fishing grounds.[1]

2. Building big data on important *agricultural germplasm resources*
   Relying on the unified national big data platform of the national seed industry, build a nationally important agricultural germplasm resource database, draw a national base map of agricultural germplasm resource distribution, and promote the digital dynamic monitoring and informatization of germplasm resources such as crops, livestock, poultry, aquatic products, and microorganisms. Carry out accurate identification and evaluation of phenotypes and genotypes of animals and plants, deeply explore excellent germplasm and genes, build a molecular fingerprint database, and provide big data support for breed selection, industrial development, and industry supervision.
3. Building big data on rural collective assets
   Establish management of electronic ledger for registration, storage, use, and disposal of collective assets, and promote the digitization of information on the verification of rural collective assets. Collect data on the clearance of rural collective assets across the country based on property rights system reform, collective economic organization registration code, collective asset financial management and other data to build national rural collective assets big data.
   Promote the digitalization of national agricultural reclamation asset management, and strengthen supervision of the possession, use, income and disposal of state-owned agricultural assets.
4. Big data for building rural homesteads
   Based on the third national land survey, satellite remote sensing, and other data, combined with information on registration and certification of the right to the use of housing sites, and surveys on the status of the use of rural housing sites and farm houses, a national rural housing database will be established which includes information on base units, spatial distribution, area, ownership, restrictions and utilization. Promote the construction of informatization on allocation of residential buildings in rural areas, their approval, circulation, utilization, supervision, statistical investigation, and improve and update basic data in a timely manner.
5. Improve the big data of farmers and new agricultural operators
   Based on the registration database of rural land contracting rights, combined with agricultural subsidy issuance, input supervision, direct reporting of new agricultural business entities, family farm directory, etc. Multi-party sharing and utilization methods to improve the basic data of the identity of the operating entity, employment, production management, subsidy issuance, supervision and inspection, use of input products, training and marketing, etc., and gradually achieve full coverage of agricultural operating entities, as well as production and operation information for dynamic monitoring.

[1] Also compare: „Food Security in China", The State Council Information Office of the People's Republic of China, October 2019 (Note by DCZ)

IV Accelerate Digitalization of Production and Sales:

1. **Cropping informatization**
   Accelerate the development of digitalized agriculture, and use satellite remote sensing, aerial remote sensing, and the Internet of Things on the ground to dynamically monitor the planting types, planting areas, soil moisture, crop conditions, and disasters of important crops, and issue early warning information in a timely manner to improve the informatization level for production management in the crop industry. Accelerate the construction of agricultural pest and disease monitoring and monitoring networks and digital plant protection and defense systems, and realize the intelligent identification, digital prevention and control of major pests and diseases. Building a digital countryside, promoting the integrated application of intelligent sensing, intelligent analysis, intelligent control technology and equipment in-field planting and horticulture, building environmental control, precision application of water and fertilizer, precision planting, intelligent operation and scheduled monitoring of agricultural machinery, and intelligent graded decision-making system, the development of an intelligent "agricultural factory" [i.e. integrated and industrialized agriculture], and the promotion of intelligent management of crop production and operation.
2. **Animal husbandry digitalization**
   Establish digital breeding ranches, promote intelligent transformation of ventilation and temperature control, air filtration, and environmental sensing equipment in livestock and poultry sheds, integrate digital equipment such as electronic identification, accurate feeding, and livestock manure treatment to accurately monitor livestock and poultry breeding inputs to achieve intelligent monitoring and accurate feeding of livestock and poultry breeding environment. Accelerate the application of intelligent monitoring technology for individual signs to strengthen the accurate diagnosis, early warning, prevention and control of animal epidemics. Promote direct reporting of data from farms (slaughter, feed, veterinary drug companies, etc.), build a dynamic database of "one field (enterprise), one yard, one animal (poultry), one standard" interconnection of information in animal husbandry production, distribution, and slaughter. Speed up the construction of a digital dairy cloud platform.
3. **Fishery digitalization**
   Promote smart aquaculture, build aquaculture production and management systems based on the Internet of Things, and promote digital technologies such as real-time monitoring of water environment, accurate feeding of bait, disease monitoring and early warning, control of circulating water equipment, automatic lifting control of cages, and drone cruise equipment and develop digital fisheries.
   Focusing on the national marine enclosure demonstration area, we will promote the construction of marine pasture visualization, intelligence information systems. Vigorously promote the application of “Beidou” navigation technology and “Tiantong” Communication Satellite in marine fishing, speed up the construction of digital communication base stations, and upgrade marine terminals and digital fishing equipment such as satellite communications, and collision avoidance for fishing vessels. Strengthen the basic research on digital technology of ocean fisheries,

improve the ability of information collection and analysis for the development and utilization of ocean fishery resources, and promote the application of video surveillance of ocean fishing vessels. Develop networking between fishery boats, promote intelligent navigation, operation and control of fishing vessels, and construct a comprehensive fishing port management system that covers fishery administration law enforcement, fishing vessel entry and exit reports, electronic fishing logs, traceability of catches, dynamic monitoring of fishing vessels, and fishing port video surveillance.

4. **Digitalization of the Seed Industry**

   Accelerate the research and development and in-depth application of big data in the seed industry, establish information capture, multi-dimensional analysis, and intelligent evaluation models, carry out intelligent data mining and analysis covering the entire chain of seed industries, such as scientific research, production, and operation, and build an intelligent service platform. In response to the needs of commercial animal and plant breeding, develop and promote technology and equipment for acquiring animal and plant phenotypic information to achieve high-quality phenotypic trait data. Intensify the development and identification of resources, establish and improve gene databases and phenotypic databases of breed resources, and provide support for deep gene mining. Combined with a digital intelligent breeding assistant platform, mining genomics, proteomics, phenotyping and other data, formulating optimized breeding programs for targeted traits, accelerating the transition from "empirical breeding" to "precise breeding", and gradually realizing customized design breeding. Coordinate the use of production and operation licenses, production filings and integrated monitoring methods to accelerate the application of digital technology in the supervision of seed production bases, livestock and poultry farms, aquatic seed farms, and trading markets, and improve the intelligent supervision of the seed industry. Establish a horizontal connection in the database, provide “one-stop” comprehensive query and business processing of seed industry data, technology, services, policies, and laws, optimize the mobile APP function of the national seed industry big data platform, and promote innovation in seed industry service models.

5. **New industry diversification**

   Encourage the development of new Internet-based formats such as crowdfunding agriculture and customized agriculture and innovate and develop network business models such as shared agriculture and cloud farms. Deepen the comprehensive demonstration of e-commerce in rural areas, implement the "Internet +" “agricultural products out of villages into the cities” project, promote artificial intelligence and big data to empower rural physical stores, and open up online and offline marketing channels for agricultural products. Encourage the development of smart leisure agriculture platforms, improve the digital map of leisure agriculture, guide rural tourism demonstration counties, beautiful leisure villages (fishing villages, farms), etc. to conduct online operations, and promote new business models such as public participation evaluation, digital creative roaming, and immersive experience. Promote cross-industry and cross-domain data fusion and service expansion, in-depth development and utilization of data resources such as agricultural production, market

transactions, agricultural inputs, promotion of business models based on big data credit, insurance and supply chain finance, create innovative service methods for supply and demand analysis, technological promotion product marketing.

6. **Quality and safety control must cover the whole process**
   Promote the standardization of production of agricultural products, formulate key standards such as classification of agricultural products, and promote the establishment of an agricultural information standardization system for the entire supply chain. Promote the identification of agricultural products, and guide production and operation entities to apply quality certification, product names, trademarks, and other marks to listed agricultural products. Promote traceability of agricultural products, improve the national information platform for management and tracing of quality and safety of agricultural products, , establish a certification system for food products, promote digitalized monitoring of agricultural product quality and safety, and establish a mechanism linking tracing management, early warning, and emergency recall.
   The production and operation data and the data of seeds (seedlings, livestock and poultry), pesticides, fertilizers, feeds, veterinary drugs and other supervision and inspection, administrative penalties, field application and other data are collected to establish a county-level input supervision and data collection mechanism.

V Promote the digital transformation of management services

1. Establish and improve the technical support system for agricultural and rural management decision-making
   Relying on the basic data resource system of agriculture and rural areas, build a big data platform for agriculture and rural areas, use big data analysis, mining and visualization technologies, establish related knowledge bases, model libraries, and develop planting, animal husbandry and veterinary medicine, fishery and fishery administration, supervision and management, science and technology education, Resource environment, international cooperation, government affairs management, statistical reporting and rural social undertakings and other functional modules, provide support services for market early warning, policy evaluation, supervision and enforcement, resource management, public opinion analysis, rural governance and other decision-making, and promote management services online and offline which promote data fusion and business collaboration, and improve the scientific nature of macro management.
2. Improve the whole industry chain monitoring and early warning system for important agricultural products
   Strengthen the monitoring of production and market of important agricultural products, strengthen the real-time collection and monitoring of production data, guide and wholesale market to adopt electronic settlement to conduct transactions, and promote the real-time collection of transaction information in key markets such as the wholesale market of agricultural products, supermarkets and e-commerce platforms. Connect and build big data on agricultural market transactions that integrate transaction subjects, transaction types, transaction volumes, and transaction prices.

Establish a global agricultural data survey and analysis system and develop and use global agricultural production and trade data. Improve information collection systems for enterprises' foreign agricultural investment and overseas agricultural product transactions. Strengthen agricultural information monitoring and early warning, expand and improve the daily monitoring of agricultural product market prices, monthly and quarterly analysis of supply and demand situation, supply and demand balance sheet of important agricultural products, and medium- and long-term agricultural outlook and other information release and services. Establish an agricultural and rural modernization monitoring and evaluation system and develop an agricultural and rural economic operation analysis system. Establish an analysis system for the economic operation of agriculture going abroad and strengthen the analysis of agricultural use of international market resources.

3. Establishment of a Service System for Digital Agriculture and Rural Areas
   In-depth implementation of the project of information entering villages and households, optimizing and improving the online services of rural communities, accelerating the construction of farm friendly Information Society, and improving social service management. Improve the agricultural science and technology information service platform and encourage agricultural experts to solve production problems for farmers online. Guide various social entities to use information network technology to carry out agricultural productive services in the fields of market information, agricultural supply, waste resource utilization, agricultural machinery operations, primary processing of agricultural products, and “private customization” of agricultural meteorology, etc. Collect management statistics such as possession of agricultural machinery and equipment and important agricultural operation scheduling data to strengthen online monitoring and information services for agricultural machinery safety. Strengthen the establishment and integration of big data on agricultural sciences and technology innovation, including international and domestic agricultural sciences and technology innovation subjects, innovation activities, and innovation output. Focus on the integration of big data on agricultural science and literature on technologies, big data on agricultural sciences, and big data on agricultural scientific research management and governance. Build a number of farmers’ entrepreneurship and innovation centers, develop online display and deal making for agricultural products, rural crafts, and rural tourism and accommodation and catering. Collect and publish information on rural labor employment and entrepreneurship.
4. Establishing an intelligent monitoring system for rural human settlements
   In conjunction with the improvement of human settlements, carry out mapping surveys, regular monitoring, gather related data resources, and establish a rural human settlements database. Establish a long-term fixed-point observation system for agricultural waste such as straw, agricultural membranes, and livestock and poultry waste, and study and promote remote monitoring of rural water sources, large-scale breeding plants, rural domestic waste disposal sites, and agricultural waste disposal sites. Encourage the development of new services such as data mining and business analysis of rural human settlements. Guide farmers to actively participate in the network supervision of rural human settlements and jointly maintain a green living

environment.

5. Building a Rural Digital Governance System
   Promote the extension of “Internet +” communities to the countryside, improve the level of village-level comprehensive services informatization, and gradually realize the online operation of village-level affairs such as information release, public information collection, deliberations, and public services. Accelerate the informatization of rural planning management, and promote the loading and uploading of village plans, online query, and real-time tracking. Promote online management of rural infrastructure construction and rural public service supply.

VI Strengthen the Innovation of Key Technologies and Equipment

1. Strengthening key common technical problems
   Aiming at the major needs of agricultural and rural modernization and rural revitalization strategies, the focus should be on mastering specialized sensors for high-quality, high-precision, high-reliability, low-power agricultural production environments and for physiological signs of animals and plants to fundamentally solve the problem of obtaining high-throughput information for digital agriculture. Breakthrough new knowledge service technologies such as agricultural big data convergence management technologies, agricultural information intelligent analysis and decision-making technologies, cloud service technology, push-messages with agricultural knowledge and “smart answering” etc., and build animal and plant growth information acquisition and production regulation mechanism models. Breakthrough in key equipment technologies such as specialized sensors for agricultural machinery equipment, agricultural machinery navigation and automatic operations, precision operations, and intelligent operation and maintenance management of agricultural machinery, promote integrated research and system demonstration of agricultural machinery agronomy and information technology, and realize agricultural machinery operation information perception, quantitative decision-making, intelligent control, precise investment and personalized services. Research and development of agricultural product quality and safety rapid analysis and detection and cold chain logistics technology, and promote applications such as quality fission detection, agricultural product automated grading packaging lines, and intelligent temperature control systems.
2. Strengthening the advanced layout of strategic cutting-edge technologies
   Facing the world's frontiers of science and technology, major national needs and key areas of digital agriculture and rural development, we have formulated a roadmap for the development of digital agricultural technology, focusing on breakthroughs in basic technologies and general technologies in the digital agriculture and rural areas. Establish a technology innovation support mechanism that combines long-term task commissioning and dynamic adjustment of staged tasks, strengthen the research and development of advanced technologies and the development of cutting-edge layout of new technologies such as flexible processing of agricultural products, artificial intelligence, virtual reality, and big data, and form a series of digital agricultural strategic technologies reserves and product reserves. Establish a disciplinary system

and innovation network that supports cutting-edge technology research, strengthen collaborative research among industry, universities, and research institutes, and build first-mover advantages that support high-end leadership. Accelerate the advancement of core technical breakthroughs such as large-scale networking of agricultural blockchains, on-chain and off-chain data collaboration, strengthen research on agricultural blockchain standardization, and promote blockchain technology in agricultural resource monitoring, quality and safety traceability, rural financial insurance, and transparent supply innovative applications such as chains. Actively carry out research on the application of 5G technology in the agricultural field and establish and improve the smart agricultural technology system led by 5G.

3. Strengthen the application and demonstration of technology integration
   Focus on key regions, key fields and key varieties, expand 3S, intelligent sensing, model simulation, intelligent control and other technologies and software and hardware products integrated applications and demonstrations and promote a number of digital agricultural and rural technology models and typical examples. Strengthen the integration and service of digital agricultural science and technology innovation data and platforms. Strengthen the construction of digital agriculture and rural standard systems, and establish data standards, data access and services, and software and hardware interfaces.
4. Accelerate R & D and application of agricultural artificial intelligence
   Implement the development strategy of agricultural robots, research and develop a new generation of agricultural robots with strong adaptability, high price-performance ratio and intelligent decision-making, and accelerate the development of standardization and industrialization. Carry out core key technologies and product research, focusing on key technologies such as motion control, position sensing, and robot manipulator control. Adapt to different crops and different operating environments, develop universal robots and special-purpose robots such as grafting, cuttings, transplanting, and arable land. Aiming at efficient and automated animal husbandry production, the company develops auxiliary robots for automatic operations such as grazing, feeding, milking, classification, diagnosis, and transportation. Develop aquaculture robots for fish tracking, feeding, and disease diagnosis. Strengthen the intelligent integration and application demonstration of drones, focus on the key visual technology of drones, promote the intelligent development of single machines to cluster intelligence, develop artificial intelligence-powered terminals, and realize real-time agricultural and forestry plant protection, aerial photography, inspection, and production testing functions.

VII Establish Large-scale Infrastructure Projects

(1) National agriculture-rural areas big data projects

1. **National cloud platform for agriculture and rural areas**
   In the context of computing and storage capabilities of agricultural and rural big data a national agriculture and rural areas cloud platform will be established covering agricultural and rural sectors at central, provincial, city and county level. Leasable social public cloud infrastructure will be built as an open cloud for big data in

agriculture and rural areas and aggregate thematic data in various industries and fields. Existing hardware resources will be integrated, information networks, servers and other facilities will be improved, a private cloud for agricultural and rural big data will be built in order to store core business data. Data sharing and exchange, calculation analysis, etc. will be conducted in accordance with unified standards to form a cross-sector, cross-region, and cross-industry agricultural and rural data convergence hub.

2. **National big data platform for agriculture and rural areas**
   Integrate the data and information resources of the administrative offices responsible for agriculture and rural areas, improve the management capabilities of data resources regarding supervision of collective assets, agricultural germplasm resources, rural homesteads and other areas, aggregate big data of farmers and new production and operation entities, big data of agricultural natural resources, and resources of important agricultural germplasm data, big data on rural collective assets, big data on rural homesteads, in order to create a “map” of national agricultural and rural data resources. Establish a unified decision-making platform with data aggregation management and analysis, realize data monitoring and early warning, decision-making assistance, and shared access, and provide data support for the development of agriculture and rural areas.
3. **National information system for administration of agriculture and rural areas**
   According to the overall deployment of the national government informatization project construction, and in accordance with the requirements of the "Six Unifications" (user management, access management, resource management, authorization management, process management, security audit), improve global agricultural data survey and analysis, comprehensive fishing port management, and agricultural mechanization management support, comprehensive monitoring and supervision of farmland construction, collaborative research and innovation in scientific research on agriculture and rural areas, and other data support capabilities to build a unified national information system for administration of agriculture and rural areas. Establish a standardization system for government affairs information systems, a security guarantee system, and an operation and maintenance management system, promote the integration of technology, data, and business, and provide support to agricultural and rural operation management and scientific decision-making.

(2) Air and ground integrated observation system for agriculture and rural areas.

1. Agriculture-rural space-based observation network projects (remote sensing and aerial photography will be used)
2. Agriculture-rural aerial-based observation network projects (drones and radar will be used).
3. Agriculture-rural supply chain observation network projects.

(3) National digital agriculture innovation projects:

1. Establishment of a national digital agriculture innovation center.

In order to enhance the ability of independent innovation in digital agriculture and rural areas, we will focus on key shared technology research, forward-looking arrangement of strategic and advanced technologies, technology integration application and demonstration, agricultural artificial intelligence research and development, and construction of digital agriculture integration, digital plantation, digital animal husbandry, and digital fisheries, digital seed industry, digital agricultural equipment and other areas of national innovation centers; in the context of advancing and promoting plantation management informatization, intelligent animal husbandry, intelligent fisheries, digitalization of the seed industry, quality and safety management and control, specialized centers will be established for rice, wheat, cotton, potatoes, field planting, facility gardening, orchards, poultry, eggs, pigs, beef cattle and sheep, dairy cows, freshwater farming, offshore farming, marine pastures, ocean fishing, crop breeding, animal breeding, tropical crops, as well as quality and safety traceability. Improve special facilities and R & D bases, develop technological research, equipment R & D and system integration innovation platforms, and promote the deep integration of digital technologies and the agricultural industry.

2. Establishment of big data for the full supply chain of important agricultural products
   In order to improve the scientific level of production and management decisions and guide market expectations, relying on strong technical strength, leading positions in the industry, we will build full supply chain big data on wheat, rice, corn, soybeans, cotton, rapeseed, sugar cane, peanuts, natural rubber, apple, citrus, vegetables, potatoes, tea, broilers, poultry eggs, pigs, sheep, beef cattle, dairy cows, fish, shrimp, crab, shellfish and feed, agricultural resources and other single-species, establish production, processing, data cleaning and mining and analysis service models for storage, transportation, sales, consumption, trade, etc., improve the monitoring and early warning system of important agricultural product markets and industrial damage, and develop and provide service products such as production conditions, market prices, and supply-demand balance.
3. Establishment of pilot projects for digital agriculture.
   In order to strengthen the construction of data resources in important areas and key links of the county-level, build a comprehensive information service system, and comprehensively promote the comprehensive application and integration demonstration of digital technologies, we will rely on county-level departments of agriculture and rural areas or their affiliated enterprises and institutions to choose leading digital food production functional areas, important agricultural product protection areas, characteristic agricultural product superiority areas, national advanced agricultural green development areas, national modern agricultural demonstration areas, and counties and cities where the national modern agricultural industrial parks are located. A number of digital agricultural pilot projects will be established to promote plantation, animal husbandry across the entire region. Digital transformation in industries, fisheries, quality and safety supervision models will be promoted.

VIII Guarantee Measures

1. Strengthen leadership at various levels of rural governance for digitalization of rural economy.
2. Provide policy support such as various investments, incentives and loans.
3. Intensify data collection management.
4. Train and promote tech talents.

Full details of the plan can be found at following links (in Chinese):

http://www.moa.gov.cn/xw/zwdt/202001/t20200120_6336380.htm

http://www.moa.gov.cn/govpublic/FZJHS/202001/t20200120_6336316.htm