

Research on the Model Design of "Cloud Raising Chickens + Sharing Rural Areas" under the Background of Rural Revitalization

Yu Chen, Yu Wang, Li Zhu, Xiaoyu Zhou

Anhui University of Finance and Economics, Bengbu, 233030, China

Abstract: China is a veritable egg producing country. At present, there are about 1.45 billion commercial substitute laying hens in China, and the egg production reaches about 24.5 million tons, which is about 4.5 times that of the United States and 7 times that of India, accounting for about 40% of the total egg production in the world (China Poultry Industry Development Report of China Animal Husbandry Association in 2015). However, the modernization level of laying hens breeding in China is relatively backward, and there is still a certain gap between the production performance and the advanced level abroad. How to improve the modernization level of China's laying hen breeding industry and improve the production performance of laying hen breeding is an urgent problem for us to solve, and responding to the call of the state to realize the "internet plus" of chicken breeding industry is an important way to achieve this goal.

Keywords: Rural revitalization; Chicken industry; Internet; Village.

1. Background

The 19th National Congress of the Communist Party of China made a major decision to implement the strategy of rural revitalization [1]. According to the overall requirements of rural development put forward in the report of the 19th National Congress of the Communist Party of China, 2019 is a crucial year to win the battle to build a well-off society in an all-round way. Resolutely winning the battle against poverty and comprehensively promoting rural revitalization have become the focus of the current work on agriculture, rural areas and farmers. The "Government Work Report" in 2019 clearly pointed out that "we should give priority to the development of agriculture and rural areas and strengthen the overall connection between poverty alleviation and rural revitalization"[2]. Not long ago, the Guiding Opinions of the State Council on Promoting the Revitalization of Rural Industries pointed out that rural industries are industries that promote agriculture, prosper rural areas and enrich farmers. Ecological chicken raising is a new industry developed in recent years, which has the characteristics of low investment, low cost, good quality, high efficiency and ecological beauty. It is a green and healthy animal husbandry, which can not only help poverty alleviation, but also promote rural revitalization [3].

2. Problems

Why is the modernization level of laying hens in China relatively backward and the production performance relatively low? Although through the unremitting efforts of science and technology workers such as animal husbandry, veterinary medicine and animal nutrition in China, the level of laying hens in China has made great progress, but there is still a certain gap with the advanced level abroad, which is inseparable from the scale structure of breeding in China [4]. According to the data, about 90% of our country's laying hens are kept in small-scale laying hens' farms with less than 100,000 laying hens in a single farm. From this, it can be seen that the scale of our country's chicken farms is small. Due to

the cost and investment restrictions, it is impossible for small-scale chicken farms with less than 100,000 laying hens to reach a relatively advanced level in technology and management personnel. These farms lack professional managers and their management level cannot keep up.

"internet plus laying hens' industry" can't be added if you want. At present, there is no successful laying hen's industry Internet company in the industry. Only Jianong Online, which is led by Weijia Group, is clearly put forward to be the Internet platform for laying hens industry, and the egg networking that Dabeinong will set up should be the second one. What's the problem? "The change of concept, the construction of business model, logistics and resource integration are the four obstacles in front of us." Specifically, the first is the change of ideas and consciousness. The awareness of enterprises embracing the Internet and the awareness of the upstream and downstream subjects of the industrial chain to accept and adapt to the Internet as a whole in the market environment need to be changed. I think the final result of most farming and animal husbandry enterprises will be "subverted" and unable to complete the real "internet"[5]. Because of their deep-rooted successful experience and fixed thinking, they look at the new world of the Internet like wearing a "thermal camera", so that they only see the "hottest" surface and rough shape, but they can't see the whole and complete details. The second is to invest. The construction of the platform and the construction of the ecological circle cost a lot of money in the early stage, and it is also free. This determination is not easy. In addition, there are not many enterprises with this strength. The third is the governance structure. The industrial internet strategy is a subversion to itself, but if the action is to keep up, it will be painful to reshape the body. This determination is not easy. The fourth is business logic [6]. The common way for the Internet to subvert traditional enterprises is to make money for free in the fields used by traditional enterprises, so as to completely take away the customer base of traditional enterprises, and then convert it into traffic, and then use extended value chain or value-added services to achieve profitability. First altruism, then egoism, this is the logic of

today's Internet. How to sell products without making money is not a good turn for farming and animal husbandry enterprises that are accustomed to giving priority to profits. The fifth is team building. There is a shortage of talents who know both the laying hen industry and the Internet [7]. Take Weijia as an example, its sales and service team is an army of tigers and wolves in the field of feed, but it is small in the fields of finance, e-commerce and data. Their transformation is a big challenge, and this determination is not easy. Sixth, I mistook Feng Jing for a horse. At present, the big problem for farming and animal husbandry enterprises is to understand e-commerce as the Internet. The bigger problem is that too many farming and animal husbandry enterprises want to be Internet enterprises. 99.9% of these enterprises are going to fail, and the direction is wrong. The more efforts, the greater the negative energy. In short, the Internet era is an era of looting and destruction. Only by destroying the previous "three views" and thinking like a madman can enterprises in the field of laying hens become the BAT of laying hens. For successful enterprises like Dabeinong and Weijia, this determination is not easy [8].

The technology of most small-scale chicken farms depends on the services of unstable rural veterinarians or upstream enterprises. However, external service personnel are prone to cross-infection due to serving multiple chicken farms at the same time, which is not conducive to epidemic prevention. Due to many restrictions on time, space and interests, technical services are often not fully in place, and technical service centers of some large enterprises are often unable to fully provide services for the same reason, which may lead to loopholes in environmental control, production index monitoring, production technical guidance, epidemic prevention and so on.

As mentioned above, the scale of 90% laying hens farms in China is below 100,000, which restricts the improvement of the overall level of laying hens breeding in China. Using Internet of Things technology and cloud computing technology to raise chickens in internet plus can solve this problem perfectly [9].

3. Internet of Things technology

The definition of Internet of Things technology is: through information sensing equipment such as radio frequency identification (RFID), infrared sensor, global positioning system, laser scanner, etc., anything is connected with the Internet according to the agreed agreement, and information exchange and communication are carried out, so as to realize intelligent identification, positioning, tracking, monitoring and management. The core and foundation of "Internet of Things Technology" is still "Internet Technology", which is a kind of network technology that is extended and expanded on the basis of Internet technology, and its client extends and extends to any goods and things for information exchange and communication. For chicken farms, all kinds of sensors are installed in chicken houses, and information such as environmental control data, growth and production indicators and mental state of chickens are shared to the server of technical service center through the Internet [10]. Because the regular enterprise technical service center has high-level technicians, standardized technical regulations and advanced testing equipment, the technicians of the technical service center are selected to analyze these data, and because the enterprise technical service center should serve thousands of households at the same time, so a large amount of data will be

gathered on the server. After calculation and analysis, that is, cloud computing, the best solution can be found, thus providing technical guidance for chicken farms, improving the management level of small-scale chicken farms, and further improving production performance. Let's name this system as the Internet of Things Cloud Computing Chicken Raising System for the time being [11].

4. Conceive

4.1. System composition

In the management of all aspects of breeding, the reasonable control of environment is very important for the growth and development of chickens. A large number of dead chickens often occur in production due to excessive temperature, and the breeding environment plays a very important role in the evaluation of chicken production performance, so the monitoring and guidance of environmental control indicators is very important. "Raising chickens in internet plus" is also the goal of environmental control. The environmental control indicators include temperature, humidity, ammonia concentration, carbon dioxide concentration, hydrogen sulfide concentration, light intensity, light duration, wind speed, etc. Therefore, we must first design these environmental indicators sensors into the system, adopt the Internet of Things technology to automatically collect data, and automatically upload them to the server of the technical service center [12]. The server can integrate a threshold alarm system, and at the same time, we can manually analyze and process data information. There are also growth indicators and production indicators of chickens, because these indicators can evaluate the level of production and reflect the problems existing in production, thus providing guidance for the next production, so these important growth indicators and production indicators should also be designed into the system, including weight, shin length, egg production rate, egg weight, food intake and so on. Due to the current cost and technical limitations, these jobs can be manually input and uploaded by the breeder temporarily. The mental state, feces and autopsy symptoms of chickens are important information for disease diagnosis and early warning, so these data should also be collected [13]. We can realize this function through webcam and integrate webcam into our system, so as to realize the function of remote diagnosis. In order to realize the convenience and timeliness of this system, we need to develop a mobile phone APP, install it on the main mobile phone of chicken farm, integrate this APP into the system, and manually input information, threshold alarm, video monitoring, technical guidance of enterprise technical service center and other functions can be realized on the APP [14].

4.2. System installation

In this way, we only need to install a chassis in the henhouse, which has a data information processing and transmission module, connect to the Internet or surf the Internet through GPRS, and then connect all sensors and webcams to the module interface, and the equipment installation of the chicken farm is completed. For the enterprise technology center, only one server and one set of PC software are needed. In addition, because the general enterprise technical service center will serve many chicken farms at the same time, this system is also a cloud computing system, and the data of each chicken farm will be uploaded to

the server cloud, so that these massive information can be analyzed by cloud computing on the server, so as to find out the best solution, such as what environmental control indicators and weight indicators can obtain the best production performance, so as to provide practical basis for technicians and better provide technical guidance for chicken farms[15]. Cloud computing system can also be applied to the management of large-scale chicken farms, installed and operated in various branches or buildings, so as to reduce management personnel and avoid cross-infection, thus achieving efficient and scientific management. This system is still very suitable under the production and operation mode of company plus farmers. After software transformation, it can also be extended to other kinds of poultry and livestock farms for installation and use. Because this system can monitor the production of henhouses 24 hours a day, 365 days a day, and can form a huge network through the cloud system, it can also be used by government functional departments to carry out epidemic monitoring and early warning, animal food safety supervision and inspection, etc., which is very suitable for the actual situation that China's aquaculture industry is scattered, small in scale and difficult to supervise. In a word, the Internet of Things cloud chicken raising system is very suitable for the small-scale and large-scale group mode of China's aquaculture industry. In response to the call of the national "internet plus", rational development and utilization of this system can provide great help for China's chicken raising industry and animal husbandry, significantly improve labor productivity and production indicators, implement scientific farming, realize the "internet plus" of chicken raising industry, and also help the national animal epidemic monitoring and early warning and animal food safety supervision.

4.3. Chicken Management Cloud Service Platform

The platform is based on SOA architecture, and adopts the component development mode based on XML and WebServices, which realizes the loose coupling of business modules/components. While fully meeting the construction requirements of various application systems on the existing platform, the future business system construction integration is considered, which ensures the expansibility of system applications. By developing the PC and mobile APP of cloud service platform, the collected environmental information is processed, and then the potential breeding rules in the data are discovered according to data mining technology, so as to realize remote browsing of data and remote control of equipment.

5. System function and implementation

5.1. Real-time environmental data monitoring and equipment control system

Remote monitoring of relevant physical parameters inside and outside the henhouse is supported, and the monitoring data can be linked with fans, water curtains, sprinklers and other equipment in the henhouse. The remote control of the equipment in the shed can be realized through the cloud service platform (PC and mobile APP). There are three control methods: (1) manually and remotely open the equipment in the henhouse according to the environmental parameters outside the henhouse; (2) Set the time interval to switch the henhouse regularly; (3) Set the critical values of parameters such as temperature and humidity, and

automatically turn on or off the henhouse equipment when it reaches the critical value.

5.2. Data storage and historical data browsing

All henhouses' environmental data, video data, operation information and other data are kept in the local service center, and the backup is kept in the cloud service center. At the same time, the platform provides data statistical analysis and query functions, and summarizes experience and scientific verification in combination with production practice, which has remarkable effect on improving aquaculture level.

5.3. Cloud service platform for real-time video monitoring and video playback

(PC and mobile APP) provides remote viewing and control functions of surveillance video, including video playback, recording, photographing, positioning, pan/tilt control and other rich functions. Deploy a large-capacity hard disk NVR for cyclic recording and regular photo storage, which provides material guarantee for scientific production and product traceability. 5.4 SMS early warning function Temperature early warning: set the temperature early warning value in linkage with the temperature and humidity sensor groups in the shed, and send a temperature early warning SMS to the user's mobile phone when any group of sensors in the shed reaches the critical value. Power failure alarm: monitor the power failure in the greenhouse, and send a short message to inform the user when power failure or power failure is detected.

6. Summarize

In this paper, the Internet of Things, multi-sensor and multi-channel data acquisition, information fusion, automation control, cloud computing and other technologies are comprehensively used to develop a monitoring system for henhouse production environment and a cloud service platform for chicken management. The henhouse production environment monitoring system has realized the functions of indoor environment monitoring (temperature, humidity, illumination, ammonia, carbon dioxide, hydrogen sulfide, etc.), outdoor meteorological monitoring, fully digital high-definition video monitoring, equipment status monitoring, power failure or power failure monitoring, and the linkage control of fans, water curtains, sprays and other equipment in the henhouse. The cloud service platform for chicken management includes PC and mobile APP, which integrates the functions of real-time environmental data monitoring, remote control of equipment, data storage, historical data browsing, real-time video monitoring, video playback and early warning. The development of this system has improved the monitoring of poultry breeding environmental information, reduced the labor cost of breeding management, significantly improved the economic benefits of poultry breeding, and promoted the large-scale, intensive and automated development of poultry breeding.

Acknowledgements

This work is supported by the Anhui University of Finance and Economics Undergraduate Innovation and Entrepreneurship training program, project number: S202110378514.

References

- [1] Yang Zhihua. Analysis on large-scale ecological stocking technology of laying hens [J]. Foreign Animal Husbandry (Pig and Poultry), 2022,42(05):48-50.
- [2] Luo Guibiao, Liu Zhitong, Long Shaofeng. linyun county's "Fufeng Yaoji" industry will help rural revitalization [J]. China Animal Husbandry, 2022(16):27-28.
- [3] Yang Liuyan. Current situation and development suggestions of chicken industry in villages and towns in the new period [J]. Contemporary Animal Husbandry, 2022(05):101-104.
- [4] Zhuang Fei, Liu Jie, Zheng Qiaofan. Little Wenchang Chicken achieved great industry [J]. China Food Industry, 2022(07):76-77.
- [5] Ren Xiaolin. Study on the Design of Medium-sized Rural Chicken Houses in Wuwei County [D]. Xi 'an University of Architecture and Technology, 2021. DOI: 10.27393/d.cnki.gxizu.20021.200100000606
- [6] Chen Xiaohua, Liu Qingsong, Chen Wanxiang. Grasp the brand development of Songzi chicken industry to boost the rural revitalization and construction of Songzi City [J]. Breeding and Feed, 2021,20 (06): 129-131. DOI: 10.13300/j.cnki.cn42-1648/s.2028.
- [7] Liu Guanglin. The Road to Yulin of Sanhuang Chicken Industry Cluster [J]. Friends of Farmers, 2020(07):4-5.
- [8] Zhou Wu, Zhao Guangping. Raising chickens and selling eggs to increase income in Chunguang Village [J]. Getting Rich, 2020(06):30.
- [9] Pan Ailuan, Pu Yuejin, Cai Chuanpeng, Du Jinping, Shen Jie, Wu Yan, Pi Jinsong, Sun Jing, Liang Zhenhua, Zhang Hao, Jason, Hu Chuanguo, Zhan Caiwei. New Action of Ecological Chicken Raising under Rural Revitalization Strategy [J]. Hubei Animal Husbandry and Veterinary, 2019,40 (10): 30-33
- [10] Huang Min, Chen Jianfeng. Key points of raising chickens in rural areas and measures for disease prevention and control [J]. Hubei Animal Husbandry and Veterinary Medicine, 2019,40 (09): 28-29. Doi: 10.16733/j.cnki.ISSN 1007-273x.2019.09.012.
- [11] Yuan Lin, Wang Yuchao. Automatic equipment into the countryside, raising chickens is very worry-free [J]. Farmer Consultant, 2015 (19): 15. Doi: 10.16734/j.cnki.ISSN 1003-7152.2015.19.008.
- [12] Tian Xianhong. Village politics in cooperative field [D]. Huazhong Normal University, 2007.
- [13] Li Hui. Socialization of raising chickens: system dissolution and power survival [D]. Huazhong Normal University, 2007.
- [14] Fan Yuefen, Li Fenlian. On the problems and suggestions in rural chicken industry [J]. Hebei Animal Husbandry and Veterinary, 2002(08):25.
- [15] Li Yuhong. Investigation and analysis report on the current situation of rural chicken industry in Huangzhong County [J]. Qinghai Journal of Animal Husbandry and Veterinary Medicine, 2002(03):30-31.