The research summary of rural logistics distribution system based on e-commerce

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Abstract. This paper analyzes the present situation of rural e-commerce logistic distribution, and puts forward the logistics mode of e-commerce distribution combined with the Internet. According to the characteristics of rural e-commerce distribution, we construct the three-level logistics network structure of rural e-commerce under cloud distribution mode, realize the two-way logistics of rural e-commerce, optimize and maintain the constructed logistics information platform. Thus reduce logistics return rate and waste of resources.

1. Preface

With the introduction of the slogan of "Mass Entrepreneurship, thousands of Innovations", the establishment of distribution network in cities, townships and villages is becoming more and more extensive, which makes the three levels of logistics distribution in cities, towns and villages form integrated services, thus promoting the development of e-commerce logistics distribution in rural areas. Under this environment, various "e-commerce into the countryside" model counties have successively built e-commerce logistics warehousing and distribution centers, and made many attempts in the rural logistics and transportation system, some of which have been promoted regularly and fixed-point. The "freight line" mode of rural logistics has been fixed, and some have implemented the "mail downlink" and "e-mail uplink" schemes in combination with township e-commerce service stations and village e-commerce service points. This model effectively solves the problems of distribution and distribution of all kinds of materials in rural logistics, such as "the last kilometer" and "the first kilometer". For the rural e-commerce logistics distribution demand, it is mainly to realize a series of needs including the express delivery high efficiency, low cost, high quality and wide range of business transactions and rural shopping. As a new service-oriented, low-cost and high-efficiency network logistics distribution model, data sharing can break through the constraints of traditional spatial regions on the scope and mode of distribution, which is consistent with the needs of rural e-commerce. The function and technology of innovative logistics distribution mode will effectively improve the efficiency of rural logistics distribution.

2. Analysis of Problems in Rural Logistics Distribution

2.1 Farmers' Innovation Consciousness is Weak

Farmers' understanding of Internet logistics distribution is not comprehensive, and their innovative consciousness is weak. Because rural areas are relatively remote and people's ability to accept new
things is relatively weak, people's acceptance of new things is relatively slow. At the same time, farmers' economic level is relatively low and their consumption ability is weak, which indirectly affects people's consumption concept. On the whole, the rural population has less use of logistics distribution, which seriously restricts the development of logistics in rural areas. Although rural logistics users are increasing, their growth rate is relatively slow.

2.2 Lack of sound logistics distribution system in rural areas
With the development of e-commerce in rural areas, the trend of e-commerce development in rural areas has been aroused. The corresponding e-commerce networks have been established in cities, towns and villages. However, due to the distance between rural villages and the distance between the surrounding villages and towns and the central network, the time cost between the networks has been increased.

2.3 The efficiency of goods distribution in the countryside is low
The cost of goods distribution in the countryside is relatively high, and the efficiency is very low. Because rural people live in more dispersed areas, the distance between each area is relatively far, if it is single-piece distribution, it will cost more. As far as the distribution of individual goods is concerned, the cost of distribution in logistics villages is twice that of distribution in County towns, and with the increase of distance, the cost of distribution of goods will increase rapidly in direct proportion. Some rural areas have inconvenient transportation and rugged terrain. During the period of logistics distribution, the cost of round trip is higher. Single distribution takes time and increases cost, which seriously reduces the efficiency of logistics distribution.

3. Construction of Rural Logistics Distribution Model

3.1 Rural Logistics Alliance Model
Establish the alliance between the rural logistics distribution platform and the third party logistics enterprises, share the goods information stored, sorted and transported in the three-level nodes of city, Township and village on the electronic commerce platform, that is, the information input of customers, drivers and end distributors, and use the third party enterprise distribution mode to serve the rural goods distribution. Third-party logistics distribution can solve the problem of rural logistics distribution by using the form of "online billing" by drivers and end distributors, as well as the problem of insufficient distribution vehicles.

Rural logistics alliance mainly consists of four modules: driver alliance, vehicle alliance, e-commerce enterprises, small and medium-sized logistics enterprises and other transport demand enterprises.

One kind of business form is: intentional drivers, vehicle owners and small and medium-sized enterprises wait for the verification and reply of the rural cloud distribution platform after registering personal and vehicle information, and join the rural logistics alliance to wait for the matching of vehicles and goods to distribute if the verification is passed; the other kind of business form is: intentional drivers, vehicle owners and small and medium-sized enterprises are registering individuals and vehicles. After that, the information is waiting for the verification of the rural cloud distribution platform, and if it is approved, the matching of trucks and goods is waiting for. The e-commerce enterprises which already have certain logistics business cooperate with the rural distribution sites according to their business. In the whole process, they rely on the Internet information platform to publish and match the information of vehicles, goods and drivers and provide vehicle sources. The information entered into the rural logistics alliance will be displayed to more customers through the cloud business platform of the rural distribution site, waiting for interested customers to carry out business cooperation. The flow chart of the rural alliance is shown in Figure 1.
3.2 Crowdsourcing Logistics Model
Crowdsourcing logistics mainly provides logistics services for rural distribution sites through third-party logistics enterprises. Within the scope of service radiation of rural cloud distribution platform, it can meet customer needs with the help of related business provided by small and medium-sized enterprises and enterprises with other logistics needs. Enterprises and enterprises enter information into the information system, and then enterprises in need can find matching business, vehicles and cargo sources according to the requirements of all parties. Crowdsourcing logistics can adopt the form of "online billing" to solve the problems of rural terminal distribution and insufficient transport vehicles. For excellent partners, it can cooperate for a long time. Its business flow chart is shown in Figure 2.

3.3 Vehicle Partnership Model
Integrating the scattered automobile resources and providing automobile rental business online will alleviate the shortage of urban and county-level distribution vehicles to rural areas. Enter vehicle information and number on rural cloud distribution platform, and there will be a continuous supply of vehicles around each node. In the process of joining, the real-time tracking of vehicles will be realized through GPS system, and the joining parties will know the vehicle and the supply situation clearly. With the help of the third-party logistics enterprises in line with the transport of vehicles, in the need for rural distribution within the radiation range to provide customers with faster services.

3.4 Electronic Commerce Entry Mode
Through Information Alliance with other third-party logistics enterprise e-commerce platforms, both partners can keep abreast of the supply of goods and vehicles at any time, increase the speed of business completion and improve customer satisfaction through information integration at both ends. The business of e-commerce alliance is shown in Figure 3.
4. Network System of Rural Cloud Distribution Information Platform

4.1 Network System of Rural Cloud Distribution Information Platform

As shown in Figure 4, the logistics network system based on the rural cloud distribution platform involves the integration of the main body of logistics information sharing, integration and distribution process classification and scheduling. Finally, rationalization of upstream distribution of agricultural products and downstream distribution of purchased goods, as well as logistics distribution service providers are realized. Distributors can also be registered as vehicle owners in rural cloud distribution platforms. In this system, first of all, logistics distribution service providers need to share their own logistics resources into cloud distribution platforms in real time to form a logistics information resource pool. Then, through the analysis and integration of various logistics information by cloud distribution platforms, dynamic matching of resources by cloud computing and other technologies can be achieved. According to the demand of logistics distribution, the distribution process is classified and scheduled. For rural or village-level farmers and businessmen who can reach directly, they can arrange distribution tasks according to the established distribution routes, and for those who can not reach directly and remote village-level farmers or businessmen, they can transfer through township-level logistics service points. At the same time, the village service point and the township service point can publish the supply and demand information to the cloud distribution platform in advance according to their own needs, such as the type of goods to be distributed, routes and so on, so as to facilitate the dynamic matching of the information published by the cloud distribution platform, so as to complete the real-time scheduling of distribution resources. In this process, it is necessary to involve the main body of circulation in collaboration with relevant enterprises according to the instructions of cloud distribution platform. Thus, the system can realize the real-time connection between the upstream and downstream two-way logistics of agricultural products, and reduce the return rate of logistics vehicles and the waste of human resources.
4.2 Optimization of Cloud Distribution Information Platform

Cloud distribution platform can be used to query the start time of order execution, execution personnel, delivery time and other information; both sides of the transaction can evaluate the completed order, including logistics evaluation, customer satisfaction evaluation, opinion and suggestions, according to the problems encountered by both sides in the execution of the order and suggestions to improve and perfect the module function.

Vehicle information query and tracking. In the process of logistics operation, users can inquire vehicle information at any time, including vehicle condition, person in charge information, vehicle GPS positioning information, vehicle route positioning and other logistics information.

4.3 Maintenance of Cloud Distribution Information Platform

Information maintenance module is responsible for module function management and maintenance, including information management, module security and upgrade, data mining module specific functions include:

① Information management. View, modify and delete the information of registered users and manage the registration of new users. Manage the information released by all users, including modification and deletion; mark the old information, record its retrieval times and response status, judge whether it is invalid, avoid the occurrence of repeated retrieval, overdue occupation of resources, etc. in order to improve the speed and accuracy of module operation. Transaction information management includes order information and order logistics information. The order information includes the time of the order, the users of the transaction, the products of the transaction and so on. The order logistics information includes the optional plan, the time planning, the choice of the traffic mode, the road condition information and the route arrangement, the logistics cost, the transfer station arrangement, the vehicle tracking and positioning and so on.

② Module security and upgrade. Maintain the normal operation of module functions, and optimize and upgrade module functions.

③ Data mining. The data in the database can be deeply excavated to predict users' needs and provide users with more accurate, timely and high-quality services.
5. Epilogue
The three-level logistics distribution system based on rural e-commerce has improved the existing logistics distribution mode in rural areas to a certain extent. Through the Internet, GPS tracking and other technologies, the rural logistics distribution platform has been constructed. The three-level goods information has been integrated. Registered drivers and terminal distributors carried out express delivery and distribution through "online billing". This system has improved the original rural logistics distribution mode and strengthened the communication of logistics information among cities, towns and villages, thus realized the overall optimization and integration of logistics and information flow.

References
[1] Yingting Li. The dilemma and innovation path of rural e-commerce [J]. Modern Marketing (Late issue), 2018 (02): 156-157.
[2] Shuliang Zhang. Research and Application of Cloud Distribution Logistics Model in E-commerce Environment [D]. Chongqing University, 2014.
[3] Rihong Xie,Zijuan Zhan. Research on the current situation and Strategies of precise poverty alleviation of rural e-commerce [J]. E-commerce, 2018 (03): 8-9.
[4] Guihua Zheng, Wanlin Huang. Problems and Countermeasures of rural logistics distribution under the background of e-commerce [J]. Economic Forum, 2016 (02): 103-106.
[5] Yan Kong. A Brief Analysis of Enterprise Logistics Distribution under Electronic Commerce [J]. Research on Economic and Social Development, 2014 (08): 63.