Hindawi
Wireless Communications and Mobile Computing
Volume 2023, Article ID 9870313, 1 page
https://doi.org/10.1155/2023/9870313

Retraction

Retracted: Logistic Distribution Route Optimization Based on RFID and Sensor Technology

Wireless Communications and Mobile Computing

Received 19 September 2023; Accepted 19 September 2023; Published 20 September 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] X. Ma and F. Wang, "Logistic Distribution Route Optimization Based on RFID and Sensor Technology," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 7599539, 7 pages, 2022.

Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 7599539, 7 pages
https://doi.org/10.1155/2022/7599539

Research Article

Logistic Distribution Route Optimization Based on RFID and Sensor Technology

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Received 9 July 2022; Revised 18 August 2022; Accepted 13 September 2022; Published 24 September 2022

Academic Editor: Aruna K K

In order to solve the problem that the traditional e-commerce logistic distribution path optimization algorithm takes a long time to find the optimal path, this paper presents the best ways for exporting based on RFID and sensor technology. First, the integration algorithm is used to divide the logistic area; then, the purpose of various goals to improve the performance of the export consists of five things: measuring weight, measuring time, measuring the importance of customers, window measuring time, and general measurement method. Finally, determine the weight distribution target and find ways to better the target according to the differences in e-commerce logistics to improve the efficiency of e-commerce logistic distribution methods. Experimental results show that the optimal time to find the optimal method is less than 2 minutes, while the custom algorithm takes 3 minutes to find the optimal method. *Conclusion*. The logistic distribution optimization algorithm based on RFID and sensor technology takes less time to find a better way than the traditional process and can meet the needs of e-commerce logistic distribution layer standard optimization.

1. Introduction

The logistic distribution path is very important in urban economic development. Under certain conditions, by improving and optimizing the planning of the most appropriate distribution path, we can effectively reduce distribution costs and material losses [1]. Shortening the distribution route reduces the transportation expenditure for enterprises and the consumption loss of the masses. Urban logistic distribution channels are related to the people's livelihood of the whole city. Therefore, it is necessary to plan the transportation quality and improve the efficiency of shipment at the lowest cost [2].

The availability of logistic distribution methods directly affects the speed and cost of logistic distribution. Therefore, it is important to use the right approach when planning your route. Choosing the path optimization goal is the premise of path planning. According to the specific distribution problems of customers, we can design a reasonable distribution scheme to realize the optimization of the route. Efficiency maximization is the idea of path optimization, and the realization of efficient distribution is the key to the development and operation of enterprises. The efficiency of logistic path optimization is the standard to assess the overall level of enterprises, which is fed back by performance and profit indicators. Therefore, the distribution profit of enterprises directly affects the development of enterprises [3]. Improving the efficiency of logistic distribution needs to start from many aspects, and the development effect of enterprises is the key to enhancing the competitiveness of enterprises. Based on the development effect of enterprises, different distribution path optimization objectives need to be designed, but these different distribution objectives have an ultimate requirement, that is, low cost, which is also the purpose of shortening the logistic distribution path. The research shows that there is an obvious relationship between the cost consumption of vehicle distribution and the choice of the driving route.

Secondly, the optimization purpose of the designed distribution route also includes the specific conditions of transportation, such as the type of transportation goods, the time requirements of transportation, and the weight of transportation goods. Therefore, the number of routes depends not only on the shortest distance and the lowest cost of the enterprise but also on the relevant conditions of logistic distribution [4]. In addition to the above objectives, customer satisfaction and personalized needs are also the objectives of logistic distribution path optimization. Third-party logistic distribution must meet the needs of customers and increase its competitiveness. In route optimization, professional distribution methods should be formulated according to the actual needs of customers, and the vehicle distribution process should be adjusted to achieve on-time distribution. Therefore, the objective of route optimization should be selected according to the actual problems. With the development of the Internet, e-commerce has also developed rapidly. In this environment, the logistic industry must keep pace with the development of the Internet, actively innovate, and shorten the distribution path which can significantly reduce logistic costs, which plays an important role in reducing material losses and improving interests [5].

2. Literature Review

The Internet of Things is a combination of RFID, sensor technology, artificial intelligence, and other technologies to create a smart network that can sense the real world [6]. New farm products are perishable, so it is difficult to put them around. A combination of the Internet of Things and agricultural products, short, using RFID, radio frequency identification, and other technology provides information about transportation and goods of agricultural implements and vehicles in real time in the distribution of goods, creates network data, and works smart accordingly [7].

The cold chain logistic environment monitoring system is based on radio frequency identification technology and sensing technology [8]. This system can monitor the environmental parameters of goods in the storage and transportation stages in real time and judge whether they meet the standards through the monitoring center, so as to adjust in time and reduce losses [9]. Temperature and time in cold chain logistics are two risk factors that must be considered, and temperature is important. They run through the whole process of storage, transportation, and distribution [9]. If handled improperly, it may cause the accumulation and irreversibility of quality reduction and even affect the safety of products. In this paper, the traditional environmental monitoring method is replaced by an RFID tag, which is equipped with an antenna RFID chip, temperature sensor, humidity sensor, and light sensor [10]. After the label is placed in a suitable position, the sensor will collect the temperature, humidity, and light information of the environment in real time, write the information into the chip of the label, and transmit the information to the reader at the specified time interval [11]. The reader reports to the monitoring center through a wired/wireless network, and the monitoring center stores and analyzes the received data. If there is any abnormal situation, it will alarm in time and take measures.

In the context of big data, e-commerce can anticipate future customers and take advantage of personalized services. However, most companies do not use this information well in road planning, and the distribution of vehicles is not always coping with the difficult situation of modern cities, which currently does not meet the real needs of consumers [12]. In order to meet the needs of e-commerce and improve customer satisfaction, the traditional e-commerce logistic distribution optimization algorithm has improved the distribution of e-logistic products by solving problems that take a long time to find the right solution [13]. Predesign using a separation process to divide the delivery area, and improve various operational goals for the delivery process, such as weight measurement, time measurement, user measurement importantly, the timing of the measurement, and the overall measurement, and the target distribution is the best way to improve the distribution of e-commerce logistic decision to find a way [14]. Based on test results, this improvement will take less time to find a better way than the traditional process that recognizes the efficiency of e-commerce logistic distribution and the best practices.

3. Method

3.1. Department of Logistic Distribution Areas. Before optimizing e-commerce logistic distribution methods, define the e-commerce export process as shown in Figure 1.

Based on the above analysis, the logistic industry is divided into group algorithms and product distribution procedures as follows.

Step 1. Select the beginning of the group and find n files from all the files in the set group, then $n = 1, 2$ and get N files from the set group. According to the e-commerce logistic space division rule, the first division of the regions is not overlapping, and the management of N groups of centers is formed, respectively [15].

Step 2. Use the time delay model to calculate the distance between the average group and each data point, and the calculation model is as follows:

$$D(k+1) = \sqrt{g_a - f_{a+1}}. \quad (1)$$

It includes distribution area and mean group space representing subgroup data.

According to rule (1), by counting the clusters with the closest data and then dividing them into subclusters, the time spent by the vehicle on road transport will be saved experience.

Step 3. Set the centerpiece. Since group n is the most variable data, subgroup data are classified according to level 2 results.

The calculation method is add the longitude coordinates of all the points in the group and divide by the number of points. Based on this, the longitude and latitude coordinates of the new group and the location of the new group are obtained by adding and dividing the segments of each point by the number of points. The main goal is to make the distribution as smooth as possible and without compromising

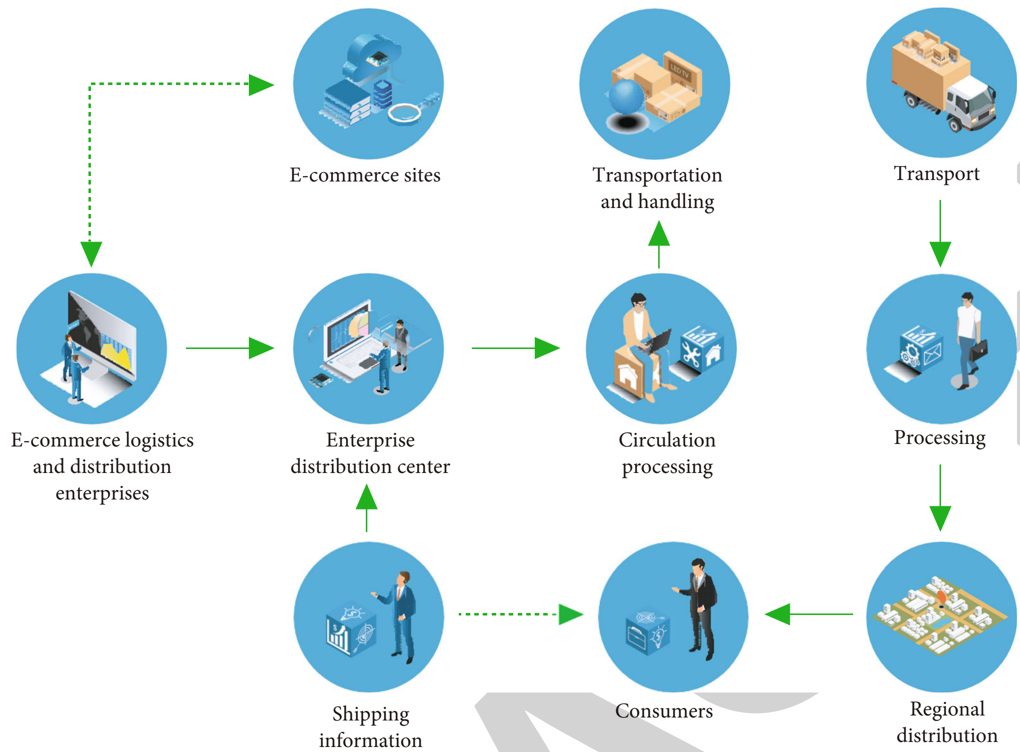

Figure 1: E-commerce distribution process.

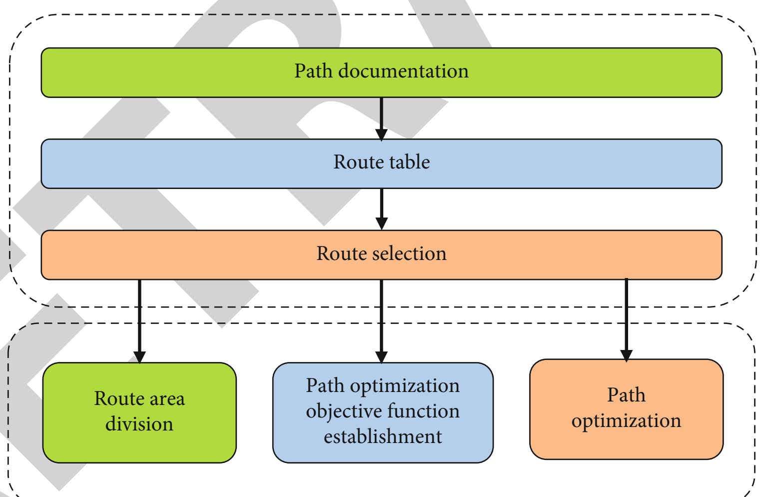

Figure 2: Path design process.

Table 1: Relative scale value.

Different levels of importance	Weight assignment
i.j the two main points are equal	1
Element *I* is a little more important than the main *j*	3
Element *I* is more important than *j*	5
Element *I* is more important than *j*	9
Element *I* is more important than *j*	8

equilibrium. Therefore, the distribution of each region should be approximately equal [16].

Step 4. Confirm the average value and compare the average of the three steps above with the final result using the average calculated in level 3 in the next cycle. The formula is as follows:

$$k_g = \sum_a q \cdot \frac{a}{f'' \cdot h}. \tag{2}$$

These include representing product groups in shipping

Table 2: E-commerce logistic goods information table.

Serial number	Weight (kg)	Importance (%)	Unloading time (h)
1	0.5	3	0.3
2	0.3	4	0.5
3	0.2	5	0.6
4	0.6	3	0.6
5	0.66	4	0.63
6	0.28	2	0.35
7	0.65	5	0.1
8	0.65	3	0.3
9	0.1	1	0.63
10	0.7	2	0.6

Table 3: Time to find the optimal path (min).

Serial number	Traditional algorithm	Algorithm in this paper
1	3.2	0.6
2	3.3	0.9
3	4.2	1.2
4	4.1	0.3
5	3.9	1.3
6	3.1	1.4
7	3.2	1.6
8	3.6	0.9
9	3.5	0.98
10	4.6	0.6

areas, representing large groups, and representing remote groups; h represents the comparison group; and a represents the speed of the distribution points. If the mean space includes the sample (2) differences, recalculate so that the dimensions of each distributor are equal.

3.2. Algorithm for E-Commerce Logistic Distribution Optimization Process. The logistic distribution system is optimized according to the above logistic department area. Before optimization, the design process is measured. The design process is shown in Figure 2.

Based on this, the delivery method is determined, and many performance goals are met, such as weight, time measurement, customer value measurement, time measurement, and all method measures. The special counting procedures are as follows [17].

Weight index: the weight of the goods should be taken into account during the e-commerce logistic division. Generally, in order to reduce fuel consumption during shipment, priority should be given to heavy shipments. The weight measurement is shown as

$$S_g = \sum_i f(g-i)^{tu}. \tag{3}$$

It includes the number of places of delivery and represents the weight of the shipment.

The amount of aging is calculated based on the above weight scale. As new coolers become more common in the e-commerce industry and lead to longer delivery times, the aging index is set to intersect with current product needs. The formula is as follows:

$$S_t = \frac{1}{N}\left(\frac{t_a - t_i}{T_{fs}}\right). \tag{4}$$

As the basis for the life of e-commerce logistic companies, customers first the products of the elite to ensure the number of customers, so the user product value index is shown as below:

$$S_j = \frac{1}{N}\left(\frac{N-i}{m_j}\right), \tag{5}$$

where n represents the order of goods of important customers, m_j is the priority selection factor, $1/N$ represents the importance classification factor, and $\dot{i}$ is the number of priority customers.

Finally, count all the indexing options for e-commerce logistic distribution. Since logistics divides methods differently, include all the methods in the index to improve product distribution. The formula is as follows:

$$S_k = \frac{1}{F}\left(\frac{n+1}{h_y \cdot j}\right), \tag{6}$$

where S_k represents the distance between the kth distribution point and represents the return method after shipping and the coefficient of variation for each method and n is the total value measured.

Based on the above weights, the time of the measurement, the measurement of customer value, the time of the measurement, and the whole method of measurement, the purpose works to improve shipping quality.

E-commerce logistic distribution centers have different distribution objectives, so the distribution objectives are weighted. Prior to the modification, the above operational goal was not general, and the standard calculation was as follows:

$$x^e = \frac{x-n}{M-m}, \tag{7}$$

where $\mathcal{X}^e$ represents the measured value of each strategy, M represents the minimum value of m, and x represents the highest value in n.

Based on the general adjustment above, the weight is determined, and the relative results are measured by comparing the two. Assessments are shown in Table 1.

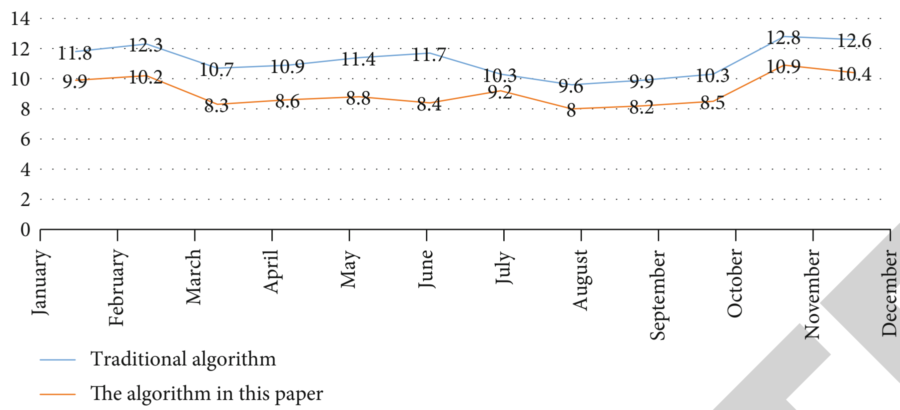

FIGURE 3: Statistical chart of goods distribution expenses.

TABLE 4: Measurement error of travel path time.

Error index	Traditional algorithm	Algorithm in this paper
Relative error	88.21	66.03
The average relative error	7.53	8.12
True relative error	6.85	6.53
The higher the relative error	1.27	1.02
The square root of the numbers of the squares of the relative error	0.06	0.02
Equalization coefficient	0.70	0.42

Optimize the distribution method according to the above logistic distribution index function and weight:

$$G = \eta * (W_2, W_3, W_4, W_5, W_6), \quad (8)$$

where W_2, W_3, W_4, W_5, W_6 represent total load weight, measured time, user value index, time window index, and total process index, respectively, and η is a good proportional growth factor.

Consider the importance of each position according to model (8) to improve e-commerce logistic distribution in order to find a better way for operational goals.

3.3. Simulation Test. In order to measure the performance of the algorithm of the e-commerce logistic distribution optimization method developed above, the process is usually compared with the algorithm developed in time in two ways. Find better methods of comparison [18].

3.3.1. Test Data. Test data is provided by the e-commerce logistic distribution center. A total of 10 units will be distributed to the distribution area of the logistic center. The main data of the products for these 10 markets are shown in Table 2.

Examining Table 2, it can be seen that the weight, values, and load times of the 10 distribution divisions were different. We use two options to find the best solution for these 10 products, and we compare the time between the two options to find the best solution.

4. Results and Discussion

Table 3 shows the emergence of the e-commerce logistic division optimization algorithm and traditional algorithm to find a solution in this period.

Table 3 shows that the time to find the best way to improve these models is less than 2 minutes, while the time to find the best way to improve the correction algorithm is more than 3 minutes, about 4.6 minutes. The comparison shows that the process always takes 10 times longer to find a better way than the algorithm developed this time.

As can be seen from the above experiments, the e-commerce logistic distribution optimization algorithm developed in the background of big data in this way can meet the requirements and needs of e-commerce with shorter lead times to find better ways than traditional processes and optimization of logistic industry distribution methods.

After comparing the improved design with the standard one, Figure 3 shows the results of a one-year logistic division of the cost of an e-commerce logistic center.

As the analysis in Figure 3, in the case of finding a way to effectively use the optimization process developed during this period, the total cost of shipping per year of the e-commerce logistic distribution area is 1.094 million yuan. In order to find a better way to use the traditional process, the total export value of the e-commerce logistic distribution area for one year is up to 1,343,000 yuan. In comparison, finding a good way to use this decoration can save 249,000 yuan in shipping costs per year.

Based on the above metrics, e-commerce logistics distribution methods have been streamlined to meet the big data, and in the meantime, shipping and marketing costs have been lower than usual e-commerce logistic distribution optimization tools. In order to clearly describe the performance of different algorithms, the efficiency of the results of different algorithms is compared with the best model, and the error is presented in the paper. The results are shown in Table 4.

From the analysis of Table 4, two different optimization algorithms show that the visual error of the e-commerce logistic distribution optimization algorithm takes less time than the completion of the traditional algorithm compared to the real model. The experimental results above show that the best way to improve the efficiency of e-commerce logistic distribution is similar to the best way [19].

5. Conclusion

This document describes the delivery of RFID and sensor technology. Because the traditional e-commerce logistic distribution optimization algorithm takes a long time to find a good way, the e-commerce logistic distribution optimization algorithm is based on big data history. First, the goods are distributed by a group algorithm, and then, various goals are set to improve the delivery process, such as weight measurement, time measurement, customer importance measuring equipment, window measuring time, and general measurement. Finally, a heavy-duty distribution plan was created to find better ways to achieve operational goals to improve e-commerce export business. As an attempt to compare the results, this time, the e-commerce logistic distribution optimization algorithm developed from the big data history can meet the needs of e-commerce logistics by spending less time to find the best solution based on the standard process category. When using the algorithm in practice, it needs to be constantly updated as the city grows.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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