

Research on Cold Chain Logistics Distribution Path Optimization under the Application of Big Data

-- Take Chengdu Shuangliu District a Company Agricultural Products Co., Ltd. as an example

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Abstract: The perishable of fresh agricultural products and the improvement of people's requirements for food quality have put forward higher requirements for the distribution efficiency. This article for the cold chain of fresh agricultural products logistics distribution path optimization problem, in Chengdu shuangliu district A company agricultural products co., LTD., as A research object, using the particle swarm algorithm of the original raw agricultural products distribution path optimization design, calculate more reasonable distribution scheme, effectively improve the distribution efficiency, vehicle rate, and reduce the use of the vehicle, reasonable to reduce the logistics costs, ultimately improve the economic benefit of the enterprise and customer satisfaction, realize enterprise scientific logistics management.

Keywords: Cold Chain Logistics; Path Optimization; Particle Swarm Algorithm; Big Data.

1. Introduction

Chengdu Shuangliu District a Company Agricultural products Co., Ltd. mainly deals in fruits, vegetables, meat and other fresh agricultural products. With the rapid economic development, the demand for rich nutritional value foods such as vegetables, fruits and meat are also increasing. But considering the characteristics of fresh agricultural products have perishable, in the distribution link need to consume more resources to ensure its quality, and the optimization of logistics distribution route is critical, so we can optimize the company distribution speed, cost, etc, to achieve under the big data application of cold chain logistics distribution path optimization. This paper uses the particle swarm algorithm [1] Further optimize its distribution route scheme, so that under the limited resources to achieve the maximum benefit, the maximum cost savings.

2. Theoretical Principle

Cold chain logistics [2] Refers to the system design in order to ensure food quality, reduce food consumption, from the production, storage, transportation, sales of each link, frozen food is always in the prescribed low temperature environment, is a low temperature logistics process based on refrigeration technology.

Fresh agricultural products cold-chain logistics [3] Refers to from the production, storage, transportation, sales to consumption of each link, fruits, vegetables, meat and other products are always in the prescribed low temperature environment, in order to ensure that the products have a better quality of a systematic project.

3. Research Technique

3.1. Overview of the Particle Swarm Algorithm

Particle population algorithm [4], Also known as particle swarm optimization (PSO), and, like the genetic algorithm (GA), starts with the ideal solution of the iterative stochastic model. PSO is a solution based on appropriateness. PSO is

simple and easy to practice, and it obtains the global ideal value by capturing the ideal value. The particle swarm algorithm can be regarded as an evolutionary algorithm with the advantages of high accuracy, fast convergence rate and easy implementation.

3.2. Basic Principles

The optimization strategy of the particle swarm algorithm is mainly to find the ideal path and the lowest cost overall solution. In the particle swarm algorithm, a swarm composed of $X = (X_1, X_2, \dots, X_n)$ flies at a certain speed in D dimensional space $V = (V_{i1}, V_{i2}, \dots, V_{id})$, each position where the particle flies by $X = (X_{i1}, X_{i2}, \dots, X_{id})$ corresponds to a solution, and the trajectory of the particle motion is the search process. Each particle updates its position and speed based on its historical point $P = (P_{i1}, P_{i2}, \dots, P_{id})$ and the area around the particle population $P_g = (P_{g1}, P_{g2}, \dots, P_{gd})$. The common speed and position update formulas are as follows:

$$v_{id}^{t+1} = w \cdot v_{id}^t + c_1 r_1 (p_{id}^t - x_{id}^t) + c_2 r_2 (p_{gd}^t - x_{id}^t)$$
$$x_{id}^{t+1} = x_{id}^t + v_{id}^{t+1}$$

among, c_1 , The c_2 is the learning factor, The c_1 is the factor that adjusts the particle to fly towards its optimal site, The c_2 is the factor that adjusts the flight of the particle to the global optimal location; r_1 , The r_2 is a $[0, 1]$ The random value of the interval; W is the inertia weight, Usually, for $(0, 1)$ Random value of the interval, The magnitude of w determines the magnitude of the effect of the current velocity of the particle on the velocity at the next moment, The larger the value of w , The greater the motion inertia of the particles, The stronger the overall search effort is, therefore, A suitable inertial weight can improve the algorithm performance and search capability, And reduce the number of iterations. It can be seen from the formula that in the special case of $w=1$, the commonly used standard PSO becomes the basic particle swarm algorithm. The speed of each dimension is limited to the maximum speed V_{max} ($V_{max} > 0$), $V_k = -V_{max}$ when $V_k = -V_{max}$, $V_k = -V_{max}$, and when $V_k < -V_{max}$, $V_k = -V_{max}$.

The particle swarm algorithm is to update the particles again and again, and finally make all the particles quickly converge to the ideal target, until the speed is zero, and the target fitness function value of all the particles is equal.

3.3. Calculation Steps

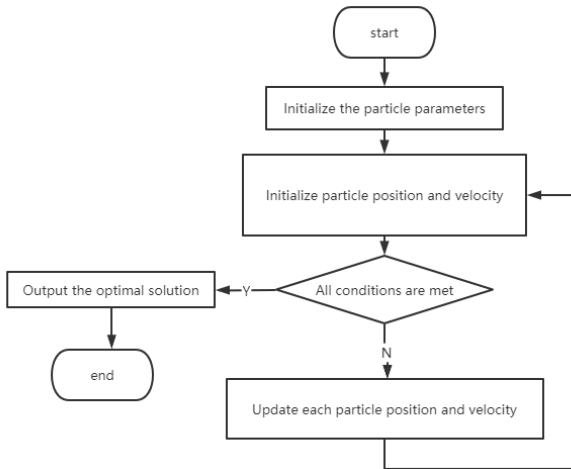


Figure 1. Flow chart of the particle swarm algorithm

- Step 1: Initialization of the related parameters.
- Step 2: Calculate the fitness values for all of the particles.
- Step 3: Calculate according to the formula, update the speed and position of the particle, and judge whether it is crossed.
- Step 4: For each particle, the calculated particle fitness value is compared to the fitness value at the best position it sought.

Step 5: For each particle, compare the overall ideal fitness of the particle to the adaptation value of the best position in the population.

Step 6: Determine whether the termination conditions are met.

See in Figure 1.

4. Analysis of the Distribution Status Quo of Company A in Shuangliu District, Chengdu City

4.1. Analysis of the Distribution Status Quo

The total transportation capacity of the company is 12 tons, and the daily transportation time is relatively fixed. From 22 PM to 1 am, 6 own vehicles will be arranged to deliver to 19 stores in Shuangliu District, as shown in Table 1.

Table 1. Vehicle Information of refrigerated vehicles

order number	motorcycle type	load	quantity
1	Jiangling refrigerated truck	2T	6

The number of agricultural products distribution center and each distribution door of The A company in Shuangliu District of Chengdu are shown in Table 2. The daily demand and time window of each distribution door are shown in Table 3. The distribution center and distribution door on the map are shown in Table 1:

Table 2. Serial number and name of stores

number	Store name	number	Store name
0	DC	10	Company A Fresh supermarket (10 stores)
1	Company A (Store 1)	11	Company A Fresh supermarket (11 shore)
2	Company A (2 stores)	12	Company A Fresh supermarket (12 stores)
3	Company A (3 stores)	13	Company A Fresh supermarket (13 stores)
4	Company A Fresh supermarket (4 stores)	14	Company A Fresh supermarket (14 stores)
5	Company A Fresh supermarket (5 stores)	15	Company A Fresh supermarket (15 stores)
6	Company A (6 stores)	16	Company A Fresh supermarket (16 stores)
7	Company A (7 stores)	17	Company A Fresh supermarket (17 stores)
8	Company A Fresh supermarket (8 stores)	18	Company A Fresh supermarket (18 stores)
9	Company A Fresh supermarket (9 stores)	19	Company A (19 stores)

Table 3. Daily demand and time window of each distribution store (unit: ton)

Store point	1	2	3	4	5	6	7	8
quantity demanded	0.4	0.35	0.4	0.3	0.45	0.25	0.55	0.5
Time window	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]

Renewal table 3 Daily demand and time window of each distribution store (unit: ton)

Store point	9	10	11	12	13	14	15	16
quantity demanded	0.3	0.4	0.35	0.2	0.25	0.2	0.5	0.4
Time window	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]	[22,24]

Renewal table 3 Daily demand and time window of each distribution store (unit: ton)

Store point	17	18	19
quantity demanded	0.35	0.45	0.3
Time window	[22,24]	[22,24]	[22,24]

The distance between the agricultural products distribution center of The Company A in Shuangliu District of Chengdu

city and the 19 distribution stores and each distribution store is shown in Table 4:

Table 4. Shortest distance between distribution stores and distribution centers and distribution stores (unit: km)

Dj	0	1	2	3	4	5	6	7	8	9
0	0	5.3	4.6	5.1	2.6	6.1	4.5	10.4	11.7	11.7
1	5.3	0	4.2	4.8	4	4.6	5.9	6.5	9.9	11.2
2	4.6	4.2	0	0.9	2.5	1.9	1.9	8.5	13.2	12.4
3	5.1	4.8	0.9	0	2.3	1.9	1.2	9.6	12.6	12.6
4	2.6	4	2.5	2.3	0	4.3	2.6	10.6	12	11.9
5	6.1	4.6	1.9	1.9	4.3	0	1.2	8.8	12.9	13.5
6	4.5	5.9	1.9	1.2	2.6	1.2	0	10.9	13.1	13.1
7	10.4	6.5	8.5	9.6	10.6	8.8	10.9	0	4.2	6.2
8	11.7	9.9	13.2	12.6	12	12.9	13.1	4.2	0	3.8
9	11.7	11.2	12.4	12.6	11.9	13.5	13.1	6.2	3.8	0
10	6.7	11.8	9.8	9.7	7.8	10.9	10.5	18	20.7	17.7
11	16.6	11.1	17.5	14.3	13.7	17	18	7.3	2	3.1
12	12.8	12.3	13.5	13.7	13.1	14.1	14.2	5.3	3.3	7.1
13	19.7	11.4	16.6	18.6	17.4	14.6	15.6	5.8	7.3	12.1
14	13.6	11.2	13.2	15.3	13.8	14.6	15.6	5.2	4.7	8.6
15	16.2	13.3	14.8	15	14.6	15.8	15.5	6.9	2.3	2.8
16	18.3	11.3	15.3	17.2	16	16.4	14.2	5.7	8.9	13.2
17	14.2	11.7	13.8	15.9	14.4	15.2	16.2	5.4	4.9	9.2
18	9	12.9	10.3	9.6	8	10.5	9.3	19.2	23	20
19	13.9	12.3	20.6	14.7	14.1	15.7	15.2	5.9	4.3	8.4

The shortest distance between distribution store and distribution center and distribution stores (unit: km)

Dj	10	11	12	13	14	15	16	17	18	19
0	6.7	16.6	12.8	19.7	13.6	16.2	18.3	14.2	9	13.9
1	11.8	11.1	12.3	11.4	11.2	13.3	11.3	11.7	12.9	12.3
2	9.8	17.5	13.5	16.6	13.2	14.8	15.3	13.8	10.3	20.6
3	9.7	14.3	13.7	18.6	15.3	15	17.2	15.9	9.6	14.7
4	7.8	13.7	13.1	17.4	13.8	14.6	16	14.4	8	14.1
5	10.9	17	14.1	14.6	14.6	15.8	16.4	15.2	10.5	15.7
6	10.5	18	14.2	15.6	15.6	15.5	14.2	16.2	9.3	15.2
7	18	7.3	5.3	5.8	5.2	6.9	5.7	5.4	19.2	5.9
8	20.7	2	3.3	7.3	4.7	2.3	8.9	4.9	23	4.3
9	17.7	3.1	7.1	12.1	8.6	2.8	13.2	9.2	20	8.4
10	0	19.5	24.9	27.1	25	19.2	25.8	25.6	3.1	24.8
11	19.5	0	4.4	10.1	6.9	1.2	9.2	7.5	21.9	6.7
12	24.9	4.4	0	4.5	1.9	4	7.3	2.4	24.7	1.8
13	27.1	10.1	4.5	0	3	8.9	2.2	2.5	27.7	3.1
14	25	6.9	1.9	3	0	5.6	4.1	0.6	21.6	1.2
15	19.2	1.2	4	8.9	56	0	10.9	7.2	21.5	6.3
16	25.8	9.2	7.3	2.2	4.1	10.9	0	4.3	25.1	6.3
17	25.6	7.5	2.4	2.5	0.6	7.2	4.3	0	28.2	0.8
18	3.1	21.9	24.7	27.7	21.6	21.5	25.1	28.2	0	27.7
19	24.8	6.7	1.8	3.1	1.2	6.3	6.3	0.8	27.7	0

Through the field investigation and investigation of the agricultural products distribution center of The Company A in Shuangliu District of Chengdu, the original distribution plan of fresh agricultural products of the agricultural products

distribution center of Company A is obtained, and the actual situation of the corresponding vehicles and distribution stores in Shuangliu District of Chengdu is obtained. As shown in Table 5:

Table 5. Original fresh agricultural products distribution plan and vehicle distribution corresponding stores

Vehicle number	Distribution route planning	Load weight (ton)	Delivery distance (km)	no-load ratio
1	0→14→17→19→0	0.85	28.9	57.50%
2	0→7→1→0	0.95	22.2	52.50%
3	0→8→11→15→9→0	1.65	29.4	17.50%
4	0→16→13→12→0	0.85	37.8	57.50%
5	0→4→3→2→5→6→0	1.75	13.4	12.50%
6	0→18→10→0	0.85	18.8	57.50%
amount to	—	6.9	150.5	—

As can be seen from the original distribution plan of the distribution center of Company A, the above distribution plan uses six cold chain vehicles. The route of No.1 is 01417190; the route of No.2 is 0710; the route of No.3 is 0811 15 90; the route of No.4 is 016 13 12 0; the route 0 of No.5 is 0432560; the route of No.6 is 018 100; the total load weight of 6 cold chain vehicles is 6.9 tons, that is, the total daily demand of 19 distribution stores, and the total mileage of the distribution lines of 6 cold chain vehicles is 150.5km.

4.2. Problems Existing in the Distribution Routes

In the daily distribution process of agricultural products distribution center of Shuangliu District A, Chengdu, the distribution plan is mainly organized according to the driver's practice and distribution experience. But this method lacks scientific basis, there are many unreasonable places. If this method continues, the cost of distribution will increase greatly. The specific problems are described as follows:

Due to the characteristics of the food itself, fresh agricultural products are not reasonably placed in the distribution process, or due to the influence of road traffic conditions, distribution time, transportation mode and other factors, it is easy to be damaged. After data investigation, the damage rate of the company's fresh agricultural products has been high in the process of distribution and transportation.

The distribution of fresh agricultural products from the distribution center to the store produces actual distribution costs, including the fixed cost generated by each time the start of the refrigerated vehicle, the product cost caused by time and temperature, the fuel cost caused by fuel consumption, and the freezing consumption cost of the loss of fresh agricultural products, etc. The accumulation of these costs is the main economic expense of Company A, of which the cost of delivery services accounts for more.

5. High no-load Rate of Vehicles

Vehicle loading rate refers to the ratio of the total weight of the actual goods loaded by the vehicle to the carrying capacity of the vehicle itself. If the vehicle loading rate is small, the utilization rate of the vehicles will be small, which will lead to the increase of the unit cargo transportation cost, and then lead to the increase of the entire distribution cost. Company A always has A high no-load rate, and more refrigerated vehicles are involved in the actual distribution process.

6. Optimization of Distribution Route of Company a in Chengdu Shuangliu District under the Application of Particle Swarm Algorithm

6.1. Basic Model Construction

The complete directed graph, $G=(V, E)$ The set of nodes is $V = \{0\} \cup V_0$. $V_0 = \{1, 2, \dots, n\}$ For the collection of distribution stores, 0 is in the distributionheart; d_{ij} For i, j Distance between the two distribution stores, and k is for the delivery vehicle. The vehicle set is a K , the vehicle capacity is a Q ; Each delivery store. The demand of q_i , T The i_k is the time when the vehicle k reaches the node i , t_{ik} For the unloading time of the vehicle k at the node i , $[E_i, L_i]$ For the delivery of the store i Time window. decision variable x_{ij}^k k Indicates whether the vehicle k reaches the point from point i to j for $1 \leq i, j \leq n$, for $0 \leq k \leq K$. Equation (1) represents the objective function with distance minimization as the objective; Equation (2) is the vehicle load constraint; Equation (3) is the total vehicle constraint; Equation (4) is the distribution store served once by one vehicle, and it is the balance constraint; Equation (5) has and only one service path for each vehicle, and returns to the distribution center; Equation (6) is the relationship between the arrival time of two consecutive distribution stores, where M is an infinite positive number; Equation (7) meets the requirements of the time window; Equation (8) is the decision variable attribute.

6.2. Optimization and Simulation of the Solution

Through the field research, the data information related to the model is obtained, specifically as follows:

- (1) The number of transport vehicles is 6, that is, $K=6$;
- (2) The total number of stores is $V=19$, that is, the agricultural products distribution center of Company A needs to deliver fresh agricultural products to 19 stores;
- (3) The rated load weight of the distribution vehicle K is $Q=2$ tons;

Enter the acquired data into the model.

The simulation experiments were performed using the MATLAB2020b software, and the main code is shown in Figure 2.

Using the particle swarm algorithm after 1000 iterations and 30 operations, the ideal solution of the target function is 130.9km. The ideal total route is for 0121417190431810011 6137081115902560. The corresponding distribution plan is shown in Table 6:

```

%%4. Initialization parameters
And c1=0.1;% individual learning factor
And c2=0.075;% Social learning factor
W = 1;% inertia factor
Number of m=100% of particles
P op = zeros (m, n);% particle position
V = zeros (m, n);% particle velocity
Gen = 1;% iteration counter
genmax=10000;% iterations
fitness = zeros (m, 1);% fitness function value Gbest = zeros
(genmax, n);% population extreme path
Gbest _ fitness = zeros (genmax, 1);% population extreme
value
Length _ ave = zeros (genmax, 1);% average length of each
generation
Ws = 1;% inertia factor max
we=0.8 ;
% Inertia factor minimum
%%5. produce initial particles
%5.1 Random generated particle initial position and
velocity fori = 1: m
pop(i, :)=randperm(n) ;
v(i,:)=randperm(n) ;
end
%5.2 Calculate the particle fitness function value
fori=1 :m
[fitness(i,~)=Z(pop(i, :),E,L,D,dem ands,cap,a,b,s,t) ;
Len
%5.3 The individual and population extremes were
calculated
Pbest_fitness=fitness ;
Pbest=pop ;
[Gbest_fitness(1),min_index]=min(fi tness) ;
Gbest(1,:)=pop(min_index, :) ;
Length_ave(1)=mean(fitness) ;
%%6. Iterate optimization
]whilegen<genmax
%6.1 Number of updated iterations and the inertia factor
gen=gen+1 ;
w=ws- (ws-we)*(gen/genmax)^2 ;
%6.2, Update speed
% Individual extreme value correction part
change1=position_minus_position(Pbe st,pop) ;
change:l=constant_times_velocity(c 1,change1) ;

% Population Extreme value corrected section
change2=position_minus_position(repmat(Gbe st(gen-
1, :),m,1),pop) ;
change2=constant_times_velocity(c2,change2) ;
% Original speed part
v=constant_times_velocity(w,v) ;
% Correction speed
fori=1 :m
forj=1 :n
ifchange1(i,j)~=0.
v(i,j)=change1(i,j) ;
end.
ifchange2(i,j)~=0
v(i,j)=change2(i,j) ;
end
end
%6.3, to update the location
pop=position_plus_velocity(pop,v) ;
%6.4 Fitness function value is updated
fitness=zeros(m,1) ;
fori=1 :m.
fitness(i)=Z(pop(i, :),E,L,D,demands,cap,a,b ,s,t) ;
end
%6.5 Individual and population extremes updates
fori=1 :m
iffitness(i)<Pbest_fitness(i)
Pbest_fitness(i)=fitness(i) ;
Pbest(i,:)=pop(i, :) ;
end
end
[minvalue,min_index]=min(fitness) ;
ifminvalue<Gbest_fitness(gen-1)
Gbest_fitness(gen)=minval ue ;
Gbest(gen, :)=pop(min_index, :) ;
else
Gbest_fitness(gen)=Gbest_fitness(gen-1)
;
Gbest(gen, :)=Gbest(gen-1, :) ;
end
Length_ave(gen)=mean(fitness) ;
Len
%%7. Results are shown

```

Figure 2. Main Code

Table 6. Distribution plan after simulation optimization

Vehicle number	Distribution route planning	Load weight (ton)	Delivery distance (km)	no-load ratio
1	0→12→14→17→19→0	1.05	30	47.50%
2	0→4→3→18→10→0	1.55	24.3	22.50%
3	0→1→16→13→7→0	1.6	35	20.00%
4	0→8→11→15→9→0	1.65	29.4	17.50%
5	0→2→5→6→0	1.05	12.2	47.50%
amount to	—	6.9	130.9	—

The change of the total path distance of Chengdu with the number of iterations is shown in Figure 3:

The new transport plan uses only five refrigerated carriers, saving the use of one vehicle compared to the original scheme.

Four distribution store tasks were assigned for No.1, No.2, No.3 and No.4 refrigerated truck, and three distribution store tasks were assigned for No.5 refrigerated truck. The total load capacity of each refrigerated vehicle is lower than the rated load capacity of 2t, and the distribution distance of each

refrigerated vehicle is much lower than the distance in the original distribution scheme. The total distribution distance is 86.83 km, which shortens the distribution distance and greatly reduces the empty load rate.

Due to the transportation in Shuangliu area, assume that the average travel speed of each refrigerated vehicle in Shuangliu area is 35 km/h, and the loading and unloading time of each store is related to the expected demand of the delivery store. According to the different requirements of each distribution store for the refrigerated truck distribution, the time when the optimized refrigerated truck arrives at the distribution store can be roughly calculated, combined with the driving time and the unloading time of each distribution store, as shown in Table 7, Table 8, Table 9, Table 10 and Table 11.

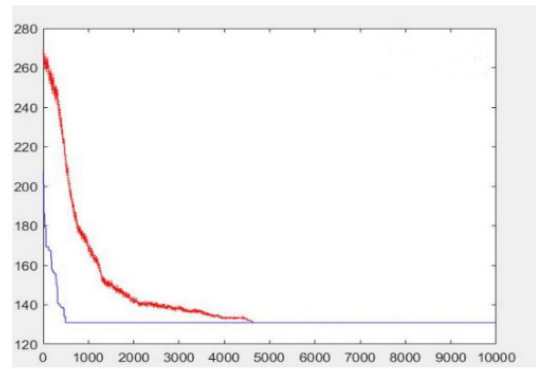


Figure 3. Optimization plot of path length change with the number of iterations

Table 7. Distribution Route Schedule of refrigerated truck No.1

Store number	Delivery time	break bulk	Discharge time	go-off	running time	Time to arrive to the next store
12	22:35	22:35	18	22:53	8	23:01
14	23:01	23:01	15	23 :16	3	23 :19
17	23 :19	23 :19	22	23:41	4	23:45
19	23:45	23:45	20	0:05	40	0:45

Table 8. Distribution Route Schedule of refrigerated er 2

Store number	Delivery time	break bulk	Discharge time	go-off	running time	Time to arrive to the next store
4	22:09	22:09	15	22:24	9	22:33
3	22:33	22:33	14	22:47	20	23:07
18	23:07	23:07	14	23:21	10	23:31
10	23:31	23:31	12	23:43	13	23:56

Table 9. Distribution Route Schedule of refrigerated Vehicle No.3

Store number	Delivery time	break bulk	Discharge time	go-off	running time	Time to arrive to the next store
1	22 :16	22 :16	18	22:34	32	23:06
16	23:06	23:06	16	23:22	5	23:27
13	23:27	23:27	17	23:44	15	23:59
7	23:59	23:59	17	0 :16	27	0:43

Table 10. Distribution Pathway Schedule of refrigerated truck No.4

Store number	Delivery time	break bulk	Discharge time	go-off	running time	Time to arrive to the next store
8	22:28	22:28	0 :18	22:46	0:08	22:54
11	22:54	22:54	0 :17	23 :11	0:04	23 :15
15	23 :15	23 :15	0 :17	23:32	0:09	23:41
9	23:41	23:41	0 :15	23:56	0:30	0:26

Table 11. Distribution Pathway Schedule of refrigerated Vehicle No.5

Store number	Delivery time	break bulk	Discharge time	go-off	running time	Time to arrive to the next store
2	22 :16	22 :16	0:24	22:40	0:09	22:49
5	22:49	22:49	0 :12	23:01	0:04	23:05
6	23:05	23:05	0 :15	23:32	0 :17	23:49

As can be seen from the above three distribution path schedules, from the starting time that returns to the distribution center, the transportation time required for No.1 is about 2 hours and 45 minutes; the transportation time required for No.2 is about 1 hour and 56 minutes; the transportation time required for No.3 is about 2 hours and 43 minutes; the transportation time required for No.4 is about 2

hours and 26 minutes; the transportation time required for No.5 is about 1 hour and 49 minutes. The fixed delivery time of the distribution center and each distribution store is concentrated in the delivery time window from 22:00 in the evening to 1:00 am on the next day. Each refrigerated truck is within the time window to ensure that every store can receive the goods on time.

7. Study Results and Analysis

The distribution distance of cold chain transport vehicles decreased from 150.5km to 130.9km, 14%; the empty load rate decreased from 42.50% to 31.00%, 27%, and the use of a refrigerated vehicle was reduced. Such a degree of optimization has achieved a significant effect for the Shuangliu area. The specific optimization results are shown in Figure 4 and Figure 5:

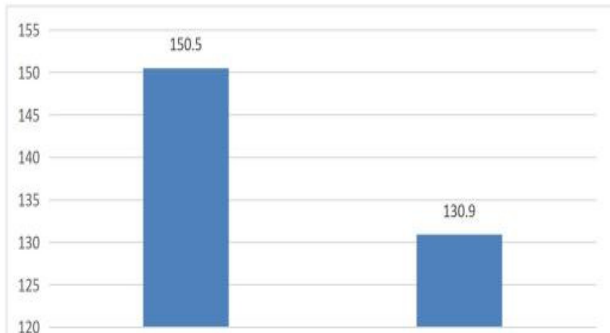


Figure 4. Comparison of optimized before and rear driving and distribution distance

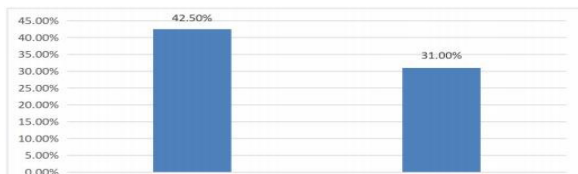


Figure 5. Comparison of no-load rate of optimized and rear vehicles

8. Conclusion

Fresh agricultural products are perishable, in the transportation process of the time and temperature requirements are very strict. The optimization of logistics distribution route is very critical. Design of reasonable transportation path can not only shorten the transportation time of products in transit, reduce the logistics cost, but also improve customer satisfaction. Under this background, this paper studies the big data application of fresh agricultural products cold chain logistics distribution path optimization problem, using the particle swarm algorithm of shuangliu district of Chengdu A agricultural products co., LTD., the original raw agricultural products distribution path optimization design, and use the MATLAB2020b software simulation experiment, finally calculated can improve the distribution efficiency, reduce empty load rate, reduce the cost of logistics distribution scheme, which can improve the economic efficiency and customer satisfaction, is advantageous to the enterprise better development.

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