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Research on the Approach and Strategy of Traditional Logistics Enterprise Transformation Under the Context of the Internet

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Abstract
In order to study the approach and strategy of traditional logistics enterprises to transform to green logistics enterprises under the background of the Internet. In Sichuan province, 1,203 samples were taken and analyzed by SPSS data. Finally, the influence factors of consumers' usage intentions are obtained. Based on the influence factors, the packaging and lines are designed to ensure the recycle. At the same time, the damage detection function of relevant magnetic stripe is used as auxiliary function, collecting the data information of consumers.

Key words: Traditional enterprises; Transformation; Information tracking; Correlation; Floyd algorithm

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INTRODUCTION

At present, the Internet is developing rapidly and the demand for visualization is increasing. At the same time, the visibility of traditional logistics enterprises is low. Its visualization includes: visualization of personnel, visualization of transportation, and visualization of infrastructure.

In the 21st century, the penetration rate of e-commerce in various areas of people's life has been continuously improved, and the logistics enterprises closely related to e-commerce are also developing rapidly. However, with the rapid development of express logistics business in China, the non-biodegradable plastic packaging and lack of consciousness of classification and recycling system have brought the mass waste of packagings, which causing environmental pollution and resource waste.

Traditional logistics enterprises rely on high artificial dependence, which is mainly reflected in three aspects: firstly, the manual processing is dispersed, the sorting, distribution and picking volume are large, and the recycle is not easy. Secondly, there is not the unified standard in the packaging market, which is not conducive to management. Finally, consumers' usage intentions of packaging products in logistics is not high.

To sum up, traditional logistics enterprises need to reform. Although there is diversity in the transformation of logistics enterprises, this paper emphasis on the reasons and suggestions for the transformation of traditional logistics enterprises into green logistics enterprises under the background of Internet.

1. REASONS AND ANALYSIS

For further study the mode of traditional logistics enterprises transform to green logistics enterprise, this article is based on the main several big logistics transit cities in Sichuan province, made into 1203 sample data, and based on the analysis of the data, in order to get the main influence factors in the transformation of logistics enterprises.

1.1 Data Source and Variable Description

To a month of time span, 200 pick-up points of Mianyang, Yibin city have carried on the questionnaire survey, finally obtained 1,203 samples data, which based on the field survey conducted and the oretical research, the objective conclusions from field investigation and analysis in quantitative way. The specific variables extracted from the questionnaire are as follows:

Customary packaging breakage rate: this paper measures the breakage rate of packaging by the ratio of the number of express break and the total number of express delivery.

Cost ratio: This paper used express packaging cost and packaging number, according to the number of use in a ratio of 1:20 calculated using recycled express the packaging cost, finally served calculated the ratio as indicators of the cost ratio.

Customary packaging cycle time: This variable is used as a measure of the number of cycle times.

Packaging sent ratio: The ratio of the number of recyclable packaging and the number of customary packaging used in this paper is used as a measure of the variable.

(Note: the limiting factor is the same vehicle cargo; samples of 10 different goods were taken as samples)

Packaging usage intention: the variable is according to the customer for packaging from very reluctant to use to very willing, using five different degree scores, one said "very reluctant to", 5 points said the "very willing to" Finally, according to the final score of the investigation object, divide by 5, and use this value as the indicator of the variable.

Use customary packaging breakage rate, cost ratio, Customary packaging cycle time, packaging sent ratio as independent variables and use packaging usage intention as the dependent variable to establish the regression equation, using the correlation coefficient, parameter estimation and the linear regression analysis to analyze and discuss.

1.2 Data Analysis

1.2.1 Simple Regression Analysis

It can be seen from the diagram above, for each independent variable and dependent variable is sex, so use "return" in the Excel tool established between variables are the regression equation, which is used to predict the future customers to use recycle packaging. As shown in Table 1.

Table 1
Regression Statistical

Regression	Statistical
Multiple *R*	0.913250586
R square	0.834026632
Adjusted *R* square	0.833472464
Standard error	0.110537244
Observation	1203

Among them:

(a) Multiple *R*: (complex correlation coefficient *R*) square root of R^2, also known as correlation coefficient, is used to measure the correlation degree between the independent variable *x* and *y*. This example *R*=0.9133 indicates that the relationship between them is highly positive.

(b) *R* square: complex determination coefficient, the above complex correlation coefficient *R* squared, to explain the degree of dependent variable y and determine the fitting effect of dependent variable *y*. The complex determination coefficient of this example is 0.8340, indicating that the dependent variable can explain 83.40% of the dependent variable.

(c) Adjusted *R* square: The adjusted complex determination coefficient R^2, which is 0.8335, indicates that the independent variable can account for 83.35%, 16.65% of dependent variable *y* is explained by other factors.

Standard error: Used to measure the size of fitting degree, and also used to calculate other statistics related to regression. This value is 0.0303. The smaller the value, the better fitting degree.

(d) Observation value: The number of observations used to estimate the data of the regression equation. The observed value in this case is 1,203.

Table 2
Variance Analysis

	df	SS	MS	*F*	Significance *F*
Regression analysis	4	73.55557494	18.38889373	1505.006376	0
Residual	198	14.63774177	0.012218482		
Total	1202	88.19331671			

As shown in Table 2: The case of significance *F* (*F*) significant statistics of *P* value is 0, less than the significant level at 0.05, so that the regression equation of the regression effect is remarkable, the equation of at least one significant regression coefficient is not zero.

As shown in Tables 2-3, the regression equation of estimation can be obtained as follows:

$$Y = 0.3889 + 2.0350\times X1 - X2 + 0.5840\times 0.0405 \times X3 - 0.2945\times X4$$

The important thing in this table is the p-value column, whose value is the P value of the regression coefficient *t* statistic.

It is worth noting that the *P* values of the t statistics of *X*1, *X*2, *X*3 and *X*4 variables are far less than the

Table 3
Regression Data

	Coefficients	Standard error	*t* stat	*P*-value	Lower 95%	Upper 95%	Lower limit 95.0%	Upper limit 95.0%
Intercept	0.388,894	0.033,991	11.441,05	7.71×10^{-29}	0.322,205	0.455,582	0.322,205	0.455,582
X variable 1	2.035,038	0.0735,12	27.683,18	8.4×10^{-131}	1.890,812	2.179,264	1.890,812	2.179,264
X variable 2	-0.584,08	0.047,783	-12.223,4	1.83×10^{-32}	-0.677,82	-0.490,33	-0.677,82	-0.490,33
X variable 3	0.040,473	0.003,194	12.671,06	1.28×10^{-34}	0.034,206	0.046,74	0.034,206	0.046,74
X variable 4	-0.294,47	0.029,512	-9.977,72	$1.41\times10\text{-}^{22}$	-0.352,37	-0.236,57	-0.352,37	-0.236,57

significance level of 0.05, so the independent variables of these items are closely related to *Y*. And the willingness of the customer to use the express package increases with the increase of the packaging sent ratio and the number of use, and decreases with the increase of the package cost ratio and the degree of damage. In other words, merchants increase the packaging sent ratio and use times of express packages, and reduce the cost and damage degree of packaging to increase customers' willingness to use the express package.

1.2.2 SPSS Fitting Analysis

Based on the ordinary Courier packing damage rate, cost ratio, using frequency, than four variables as independent variables, and willingness to use as the dependent variable, using SPSS software to the several variables for regression analysis.

(a) Correlation analysis

Table 4
Correlation Coefficients

		Packaging sent ratio	Cost ratio	Cycle time	Breakage rate	Usage intention
Packaging sent ratio	Pearson correlation	1	-.708**	.653**	-.468**	.872**
	Significance (bilateral)		.000	.000	.000	.000
	N	1203	1203	1203	1203	1203
Cost ratio	Pearson correlation	-.708**	1	-.526**	.444**	-.749**
	Significance (bilateral)	.000		.000	.000	.000
	N	1203	1203	1203	1203	1203
Cycle time	Pearson correlation	.653**	-.526**	1**	-.373**	.706**
	Significance (bilateral)	.000	.000		.000	.000
	N	1203	1203	1203	1203	1203
Breakage rate	Pearson correlation	-.468**	.444**	-.373**	1	-.551**
	Significance (bilateral)	.000	.000	.000		.000
	N	1203	1203	1203	1203	1203
Usage intention	Pearson correlation	.872**	-.749**	.706**	-.551**	1
	Significance (bilateral)	.000	.000	.000	.000	
	N	1203	1203	1203	1203	1203

Note. **. Significant correlation was found at .01 level (bilateral).

From Table 4, it can be seen that there is a correlation between packaging sent ratio, cost ratio, number of use, breakage rate and usage intention, and the correlation coefficient is significant at the confidence level of 0.01.

(b) Regression analysis

Take, for example, the ratio of the pie to the usage intention, the cost ratio and the usage intention.

The linear regression equation model between the packaging sent ratio and the usage intention:

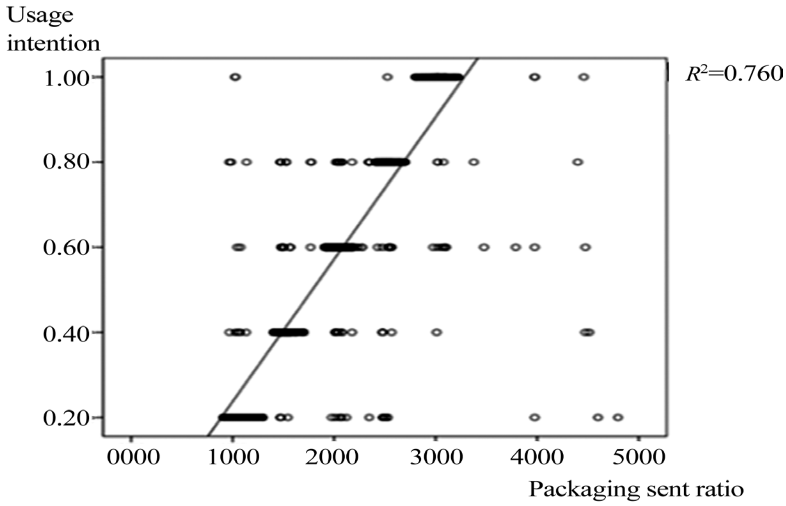

Figure 1
Linear Regression Equation Model 1

Table 5
Model Summary

Model	*R*	*R* square	Adjust the *R* square	Error of standard estimate	Change statistic				
					Change of *R* square	*F* change	*df*1	*df*2	*df*1 *df*2 Sig. *F* changes
1	.872[a]	.760	.760	.13272	.760	3805.535	1	1201	.000

Note. a. prediction variables: (constant), packaging sent ratio.

Table 6
Anova[a]

	Mode	Sum of squares	*df*	The mean square	*F*	Sig.
	Return	67.037	1	67.037	3805.535	.000[b]
1	Residual	21.156	1201	.018		
	Total	88.193	1202			

Note. a: dependent variable: usage intention.
b: Predictive variable: (constant), packaging sent ratio.

Table 7
Coefficient[a]

Model		Nonstandardized coefficient		Standard coefficient	*t*	Sig.	B's 95.0% confidence interval	
		B	Standard error	Trial version			The lower limit	The upper limit
1	(Constant)	-.097	.011		-8.433	.000	-.119	-.074
	Packaging sent ratio	3.342	.054	.872	61.689	.000	3.236	3.448

Note. a: dependent variable: usage intention.

Results from regression analysis can be found, than to use package will influence, highly explanatory power, overall adjusted *R* party is as high as 0.760, said than can be explained using pieces of pie intend to 76.0% of the variation, and the value F $P = 0.000 < 0.05$, shows that the regression model was established. The regression equation can be obtained from Tables 5-13:

Use intention =-0.097+3.342× Packaging sent ratio

It can be seen from the graph and regression equation that the willingness to use is positively correlated with the pie, and with the increase of the packaging sent ratio, the willingness to use is also on the rise.

(c) The linear regression equation model between the cost ratio and the usage intention:

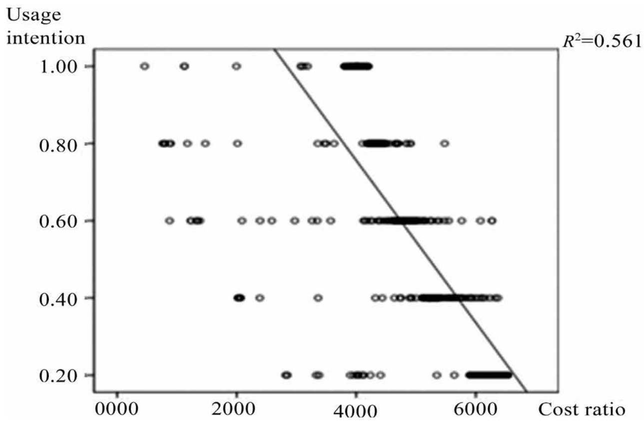

Figure 2
Linear Regression Equation Model 2

Table 8
Model Summary

Model	*R*	*R* square	Adjust the *R* square	Error of standard estimate	Change statistic				
					Change of *R* square	*F* change	*df*1	*df*2	*df*1 *df*2 Sig. *F* changes
1	.749[a]	.561	.561	.17954	.561	1534.906	1	1201	.000

Note. a. prediction variables: (constant), cost ratio.

Table 9
Anova[a]

	Mode	Sum of squares	*df*	The mean square	*F*	Sig.
	Return	49.478	1	49.478	1534.906	.000[b]
1	Residual	38.715	1201	.032		
	Total	88.193	1202			

Note. a: dependent variable: usage intention.
b: Predictive variable: (constant), cost ratio.

Table 10
Coefficient[a]

Model		Nonstandardized coefficient		Standard coefficient	*t*	Sig.	B's 95.0% confidence interval	
		B	Standard error	Trial version			The lower limit	The upper limit
1	(Constant)	1.596	.027		59.842	.000	1.544	1.649
	Packaging sent ratio	-2.101	.054	-.749	-39.178	.000	-2.206	-1.996

Table 11
Model Summary

Model	*R*	*R* square	Adjust the *R* square	Error of standard estimate	Change statistic				
					Change of *R* square	*F* change	*df*1	*df*2	*df*1 *df*2 Sig. *F* changes
1	.872a	.760	.760	.13272	.760	3805.535	1	1201	.00
2	.892b	.795	.795	.12278	.035	203.354	1	1200	.000
3	.901c	.812	.811	.11766	.017	107.712	1	1199	.000
4	.913d	.834	.833	.11054	.022	160.556	1	1198	.000

Note. a: dependent variable: packaging sent ratio.
b: Predictive variable: (constant), packaging sent ratio, cost ratio.
c: Predictive variable: (constant), packaging sent ratio, cost ratio, breakage ate.
d: Predictive variable: (constant), packaging sent ratio, cost ratio, breakage ate, cycle time.

Table 12
Anovaa

Model	Sum of squares	*df*	The mean square	*F*	Sig.	
1	Return	67.037	1	67.037	3805.535	.000b
	Residual	21.156	1201	.018		
	Total	88.193	1202			
2	Return	70.103	2	35.051	2325.038	.000c
	Residual	18.091	1200	.015		
	Total	88.193	1202			
3	Return	71.594	3	23.865	1723.768	.000d
	Residual	16.599	1199	.014		
	Total	88.193	1202			
4	Return	73.556	4	18.389	1505.006	.000e
	Residual	14.638	1198	.012		
	Total	88.193	1202			

Note. a: dependent variable: usage intention.
b: dependent variable: packaging sent ratio.
c: Predictive variable: (constant), packaging sent ratio, cost ratio.
d: Predictive variable: (constant), packaging sent ratio, cost ratio, breakage ate.
e: Predictive variable: (constant), packaging sent ratio, cost ratio, breakage ate, cycle time.

Table 13
Coefficienta

Model		Nonstandardized coefficient		Standard coefficient	*t*	Sig.	B's 95.0% confidence interval	
		B	Standard error	Trial version			The lower limit	The upper limit
1	(Constant)	-.097	.011		-8.433	.000	-.119	-.074
	Packaging sent ratio	3.342	.054	.872	61.689	.000	3.236	3.448
2	(Constant)	.408	.037		11.037	.000	.335	.480
	Packaging sent ratio	2.625	.071	.685	36.987	.000	2.486	2.765
	Cost ratio	-.741	.052	-.264	-14.260	.000	-.843	-.639
3	(Constant)	.457	.036		12.796	.000	.387	.527
	Packaging sent ratio	2.448	.070	.639	34.916	.000	2.311	2.586
	Cost ratio	-.646	.051	-.230	-12.769	.000	-.745	-.547
	Breakage rate	-.325	.031	-.150	-10.378	.000	-.386	-.264
4	(Constant)	.389	.034		11.441	.000	.322	.456
	Packaging sent ratio	2.035	.074	.531	27.683	.000	1.891	2.179
	Cost ratio	-.584	.048	-.208	-12.223	.000	-.678	-.490
	Breakage rate	-.294	.030	-.136	-9.978	.000	-.352	-.237
	Cycle time	.040	.003	.199	12.671	.000	.034	.047

Note. a: dependent variable: usage intention.

Results from regression analysis can be found that each of the regression equation has a strong influence on the results. We analyzed the influence of four independent variables on the usage intention, and found that the influence of four independent variables on the usage intention was highly explanatory, and the overall adjustment was as high as 0.833, indicating that the four independent variables could explain the change of the usage intention 83.3%, and *F* value was 160.556, P=0.000<0.05, indicating that the regression model was established. The multivariate regression equation with the influence of four independent variables on the usage intention can be obtained from table 2-13:

Usage intention=0.389+2.035 packaging sent ratio -0.584 cost ratio +0.040 cycle time -0.294 breakage ate

It can be seen from the equation that the regression coefficient of the packaging sent ratio, the cost ratio, the cycle time and the breakage rate and the usage intention is significant at the confidence level of 0.05, among which, the users' usage intention increases with the increase of the packaging sent ratio and the cycle time of recyclable packaging, and decreases with the increase of the cost ratio and the breakage rate.

As we can see from the regression equation, the users' usage intention increases with the increase of the packaging sent ratio and the cycle time of recyclable packaging, and decreases with the increase of the cost ratio and the breakage rate. Therefore, reducing the recycling cost of packaging and increasing the use of packaging can increase the user's usage intention. At the same time, according to the obtained regression equation, we can make a prediction of the usage intention of recyclable packaging of future logistics enterprises basing on the relevant research data.

2. SUGGESTION

2.1 Technological Transformation

The logistics enterprise develops and uses recyclable express packaging, Internet technology and magnetic stripe to collect and track data. At the same time, the magnetic strip is upgraded with technology, which can detect the broken and paste it on the packaging.

2.2 Mode Transformation

Transform the traditional logistics enterprise into the operation mode that can recycle the packaging products, and recycle the package of logistics express. The specific recycle mode is as follows:

Transportation rates do not vary with the transportation distance; other costs, such as the construction cost of distribution center, are not considered. The distance of recycle point will have a direct relationship with customers' recycle intention, we need to choose a point to establish a recycle bin of maximal recycling efficiency in a district including the residential, office buildings, schools, and other areas by Floyd-warshall algorithm.

2.2.1 Theoretical Assumptions

Floyd-warshall algorithm is an algorithm which uses dynamic programming to find the shortest path between multiple source points in a given weighted graph. It can correctly handle the shortest path problem with digraph or negative weight graph, and the dense graph is the best. Assume that recycling requirements from a certain point, closer point can be combined into a point, actually recycled demand comes from an area of more than one point, regardless of city traffic, construction cost of recycle bin.

2.2.2 Algorithm Steps

Each of the dots is going to be a single to m, and we know the direct path distance between any two points, and according to the data on the recyclable packagings, we get the number of recyclable packagings that need to be recycled every day, and the amount of packagings that we need to recycle at that point is the density $p_t(t=1,2,\ldots,m)$ of the dot.

The power adjacency matrix of the network graph is written:

$$d_{ij}=\begin{cases} lij \text{ (direct route distance of point } vi \text{ to point } vj) \\ \infty(vi \text{ to } vj \text{ has no direct path}) \end{cases}$$

$i,j=1,2,\ldots m$.

(a) The input weight matrix $D^0=D$.

(b) To do the relaxation operation, insert a point between vi and v_j each time v_k (k=1,2…,m), the matrix of the k_{th} iteration $D^k=(d_{ij}^{(k)})_{m\times m}$, $d_{ij}^{(k)}=\min\{d_{ij}^{(k-1)+},(d_{ik}^{(k-1)}+d_{kj}^{(k-1)})\}$, when $i=k$ or $j=k$, $d_{ij}^{(k)}=d_{ij}^{(k-1)}$, Iterate m times, you get $D^m=(d_{ij}^{(m)})_{m\times m}$, $d_{ij}^{(m)}$ is the shortest path and distance between vi and v_j.

(c) Each line of $D^{(m)}$ multiplied by the density at various points multiplied by the corresponding get

$$D*=(d_{ij}^{(*)})_{m\times m},\ d_{ij}^{(*)}=d_{ij}^{(m)}p_t(i=t)$$

(d) Add those in columns $D*$ be recycled to the recycle bin located in each difference when the express package need to walk the total distance of $W_t=(w_t)_{1\times m}$, $w_t=\sum_{i=1}^{m} dij(*)$, $w_q=\min\{w_t\}$ for the shortest total distance, the recycle bin located in $\boldsymbol{v_q}$ such recycling packaging shortest total distance, the highest efficiency.

2.2.3 Calculation Example

In the x life points, choose one point to establish the recycle in. The average number of express packages that need to be recycled every day is 250, 200, 300, 100, 350 and 450. The road network diagram is shown in Figure 3.

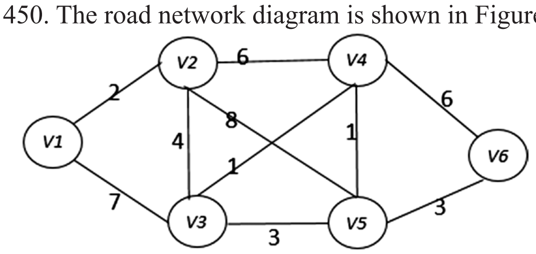

Figure 3
G

(a) according to Figure G, we can know:

$$D^0=\begin{pmatrix} 0 & 2 & 7 & \infty & \infty & \infty \\ 2 & 0 & 4 & 6 & 8 & \infty \\ 7 & 4 & 0 & 1 & 3 & \infty \\ \infty & 6 & 1 & 0 & 1 & 6 \\ \infty & 8 & 3 & 1 & 0 & 3 \\ \infty & \infty & \infty & 6 & 3 & 0 \end{pmatrix}$$

(b) The first iteration, insert v_1 at each point and compare the original path d_{ij} and path $d_{i1}+d_{1j}$ from v_i to v_1 and then v_j, and select the shorter path.

There is no new path shorter than the original path, so $D^1=D^0$, insert v_2, v_3, v_4, v_5, v_6 successively, and get the matrix of continuous update iteration.

$$D^1=\begin{pmatrix} 0 & 2 & 7 & \infty & \infty & \infty \\ 2 & 0 & 4 & 6 & 8 & \infty \\ 7 & 4 & 0 & 1 & 3 & \infty \\ \infty & 6 & 1 & 0 & 1 & 6 \\ \infty & 8 & 3 & 1 & 0 & 3 \\ \infty & \infty & \infty & 6 & 3 & 0 \end{pmatrix}$$

$$D^2=\begin{pmatrix} 0 & 2 & 6_{(123)} & 8_{(124)} & 10_{(125)} & \infty \\ 4 & 0 & 4 & 6 & 8 & \infty \\ 6_{(321)} & 4 & 0 & 1 & 3 & \infty \\ 8_{(421)} & 6 & 1 & 0 & 1 & 6 \\ 10_{(521)} & 8 & 3 & 1 & 0 & 3 \\ \infty & \infty & \infty & 6 & 3 & 0 \end{pmatrix}$$

$$D^3=\begin{pmatrix} 0 & 2 & 6 & 7_{(1234)} & 9_{(1235)} & \infty \\ 2 & 0 & 4 & 5_{(234)} & 7_{(235)} & \infty \\ 6 & 4 & 0 & 1 & 3 & \infty \\ 7_{(4321)} & 5_{(432)} & 1 & 0 & 1 & 6 \\ 10 & 7_{(532)} & 3 & 1 & 0 & 3 \\ \infty & \infty & \infty & 6 & 3 & 0 \end{pmatrix}$$

$$D^4=\begin{pmatrix} 0 & 2 & 6 & 7 & 9 & 11_{(12346)} \\ 2 & 0 & 4 & 5 & 6_{(2345)} & 12_{(246)} \\ 6 & 4 & 0 & 1 & 2_{(2345)} & 7_{(346)} \\ 7 & 5 & 1 & 0 & 1 & 6 \\ 8_{(54321)} & 6_{(5432)} & 2_{(543)} & 1 & 0 & 3 \\ 11_{(64321)} & 12_{(642)} & 7_{(643)} & 6 & 3 & 0 \end{pmatrix}$$

$$D^5=D^6=\begin{pmatrix} 0 & 2 & 6 & 7 & 8_{(12345)} & 11 \\ 2 & 0 & 4 & 5 & 6 & 9_{(23456)} \\ 6 & 4 & 0 & 1 & 2 & 5_{(3456)} \\ 7 & 5 & 1 & 0 & 1 & 4_{(456)} \\ 8_{(54321)} & 6 & 2_{(543)} & 1 & 0 & 3 \\ 11_{(64321)} & 9_{(65432)} & 5_{(6543)} & 4_{(654)} & 3 & 0 \end{pmatrix}$$

Each element in D^6 is the shortest path between points.

(c)

$$D^*=\begin{pmatrix} 0 & 500 & 1500 & 1750 & 2000 & 2750 \\ 400 & 0 & 800 & 1000 & 1200 & 1800 \\ 1800 & 120 & 0 & 300 & 600 & 1500 \\ 700 & 5005 & 100 & 0 & 100 & 400 \\ 2800 & 2100 & 700 & 350 & 0 & 1050 \\ 5950 & 4050 & 2250 & 1800 & 1350 & 0 \end{pmatrix}$$

(d) W_t=(10650,8350,5350,5200,5250,7500), the shortest total distance W_q= min(10650,8350,5350,5200, 5250,7500)=5200, that is, the recycle bin is located at v_4 recycling package with the shortest distance and the highest efficiency.

CONCLUSION AND DISCUSSION

In the process of transforming and upgrading to green logistics, traditional logistics enterprises are inseparable from the Internet. According to the research data analysis, the use of recyclable express packaging is the new direction of industry development. According to the environmental survey and demand survey, though the SPSS fitting regression analysis, the breakage rate of the goods and the cycle time of packaging are highly correlated with the consumers' usage intention. Therefore, the logistics enterprise needs to develop innovative packaging with magnetic stripe detecting the failure rate of the goods, which can reduce the damage rate of the goods, can reuse many times, and can recover the delivery packing products with the concept of green and environmental protection. On the delivery packaging recycling, Floyd algorithm is adopted to select the location of recycle station from the perspective of maximum efficiency to help the logistics enterprise express packaging recycling and improve the users' desire for recycling. At the same time, in the actual location, the packaging that needs to be recycled is not concentrated, and it can't be abstract as a point causing error. Therefore, the high time complexity of Floyd algorithm is the next research focus of this paper.

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