The Empirical Research on Influencing Factors of Intention for Green Logistics in Yangzhou City

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Abstract: As an environmentally friendly way of logistics, green logistics will be the future development direction of logistics. In order to explore the key factors affecting the development of green logistics in Yangzhou city and the way of action, 136 different scale logistics enterprises in Yangzhou city were investigated to obtain the valid sample data in this paper, and the structural equation model (SEM) was used to analyze the relationship between green logistics and green logistics in Yangzhou. The results show that governmental measures, external demand, internal drive and logistics benefits have significantly positive linear relations with intention for green logistics. From the empirical analysis of SEM, the internal drive of logistics enterprise and external stakeholders (government, consumer) act together to form power to enhance the developing intention of green logistics, taking the benefit of green logistics as the medium. Although the government played a key role in the development of green logistics, logistics enterprises was the key to the development of green logistics.

1. Introduction

With the development of social economy, logistics as the foundation of social circulation economy has penetrated into all aspects of human activities. At present, the development of China's logistics industry is relatively extensive, the level of socialization and specialization is low, and the logistics cost of economic growth is relatively high. China's total social logistics expenditures account for nearly 20% of GDP, while the United States and Japan are less than 10%, and the average developed countries are about 16%. Extensive and inefficient logistics operations have resulted in increased energy consumption and waste of energy. Green Logistics integrates the concept of environmental sustainability, emphasizes the goal of reducing environmental pollution and reducing resource consumption, and uses advanced logistics technology to plan and implement logistics activities such as transportation, warehousing, loading and unloading, distribution, packaging, etc. [1- 2]. Vigorously developing green logistics is not only conducive to enterprises to save resources, expand profit margins, enhance the core competitive advantages and sustainable development of enterprises, but also help enterprises to enhance their sense of social responsibility and enhance their social value.

As the “China Canal First City”, China Habitat Environment Award City, and National Environmental Protection Model City, Yangzhou’s logistics industry must break through the traditional logistics development model, build a new environmentally friendly logistics system, and integrate green, energy-saving, environmental protection and other green technologies. The concept is to form a green logistics system with resource conservation and environmental friendliness. However, there are few researches on the influencing factors of logistics enterprises' willingness to carry out green logistics. This study selects Yangzhou City as a specific research object. Based on the literature and data method, the factors affecting the willingness of logistics enterprises in Yangzhou to carry out green logistics are investigated through questionnaires. Through the structural equation model (SEM), the key factors affecting the logistics industry's willingness to develop green logistics in Yangzhou and its action are analyzed empirically, which provides a reference for the construction of Yangzhou green logistics development strategy.

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2. The Theoretical Basis and Conceptual Model

2.1 Theoretical basis

In 1975, American scholars Fishbein and Ajzen proposed rational behavior theory, which was mainly used to analyze how attitudes consciously affect individual behaviors, and focus on the formation process of attitudes based on cognitive information. It is considered that people are rational, and they will combine various information to consider the meaning and consequences of their actions before making a certain behavior [3]. Drawing on this point of view, "Yangzhou City Green Logistics Development Willingness" means that enterprises are willing to pay a certain cost for the implementation of green logistics and actively develop green logistics. The willingness to develop green logistics is influenced by internal and external factors.

2.1.1 External factors affecting the development of green logistics

The external influence factors affecting the development of green logistics are reflected in the main relevant subjects outside the enterprise, including government policy system, market and public, which affect the green process of logistics, as shown in Figure 2-1.

1) The promotion of government policy system

With the shortage of resources and the increasingly serious environmental damage, most countries have begun to consciously promote green logistics as the focus of the development of the domestic logistics industry, and actively develop corresponding laws and regulations for green logistics. The policy system has a strong impetus to green logistics and has become the fundamental force to promote the greening of enterprise logistics [4], which is divided into logistics planning, government regulations, policy incentives, and dissemination of green ideas [5].

2) The guiding role of the market

With economic development and social progress, green consumption has gradually become a fashion. This green consumer demand has exerted tremendous pressure on enterprises to force them to green management of the entire production process, and at the same time promote the implementation of green logistics. Therefore, the green demand of consumers is the driving force behind the development of green logistics.

The environmental awareness of the public and its corresponding actions are of particular importance to the comprehensive development of environmental protection plans, and have an irreplaceable role in the implementation of green logistics strategies [6]. The public puts environmental pressure on logistics companies through various channels to make them aware and respond to environmental pressures and take corresponding actions. In addition, public opinion requirements can also urge the government to continuously develop laws and regulations to regulate green logistics.

2.1.2 Internal factors affecting the development of green logistics

The internal factors affecting the development of green logistics refer to various factors that are generated within the enterprise and affect its implementation of green logistics, mainly including driving and restricting two types of factors. Among them, the internal driving factors of enterprises are mainly driven by the economic benefits of green logistics and social value; the main factors are the high input cost of green logistics and the constraints of the company's own strength, as shown in Figure 2.

1) The role of internal drivers

As a rational "economic man", enterprises always pursue the maximization of their own interests based on the principle of "cost-benefit" in economic decision-making. Therefore, whether the green logistics behavior of the enterprise can bring corresponding economic benefits to the enterprise is the key to generating internal driving force. The greening of logistics plays an important role in promoting the greening of an industry and the greening of the overall economy, and has important social values. For logistics enterprises, the implementation of the logistics green strategy, its social value will be significantly improved, and thus obtain long-term development [7].

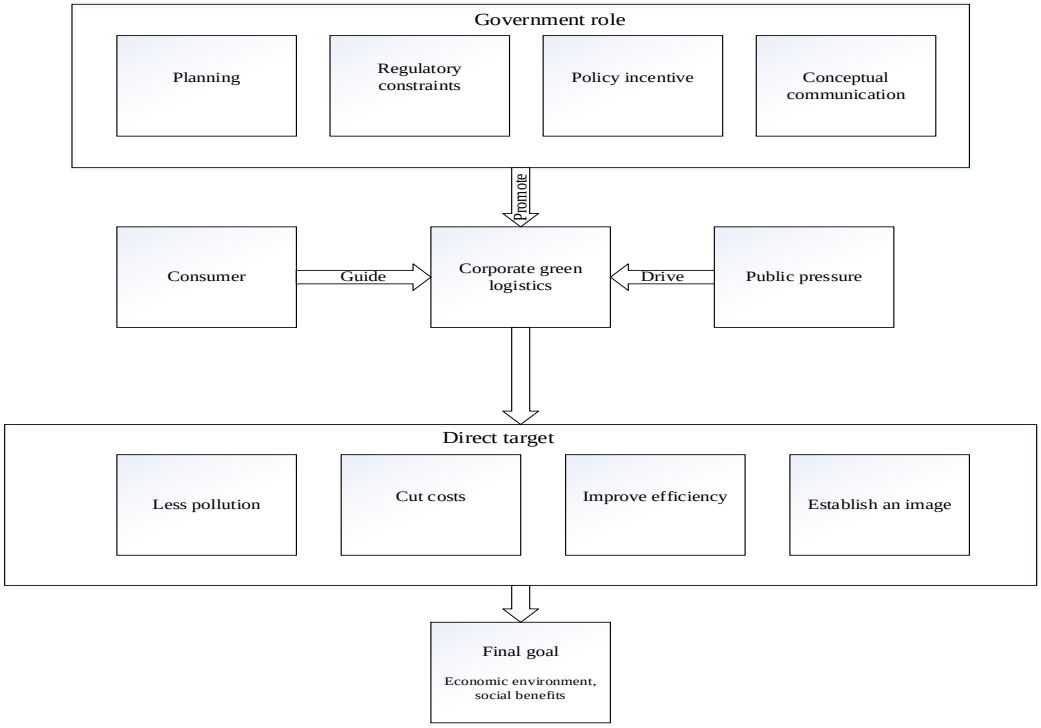

Figure 1 External factors affecting corporate green logistics

2) The role of internal constraints

Any corporate behavior requires a cost, and logistics companies are no exception to green logistics. Since the transformation of the traditional logistics system requires a large amount of capital, especially the development or application of a certain green logistics technology, the cost is huge, which brings a heavy economic burden to the logistics enterprise. In this case, the development of green logistics may not only bring benefits, but also be an inferior behavior. Due to the different operational efficiency of different strengths, the efficiency and results of improving the logistics environment are not the same. Related research shows that there is a positive correlation between firm strength and corporate environmental behavior. Generally speaking, large state-owned enterprises have strong financial strength, high management level, and strong willingness to implement green logistics; on the contrary, some small and medium-sized enterprises are less constrained in their implementation willingness due to their own strength.

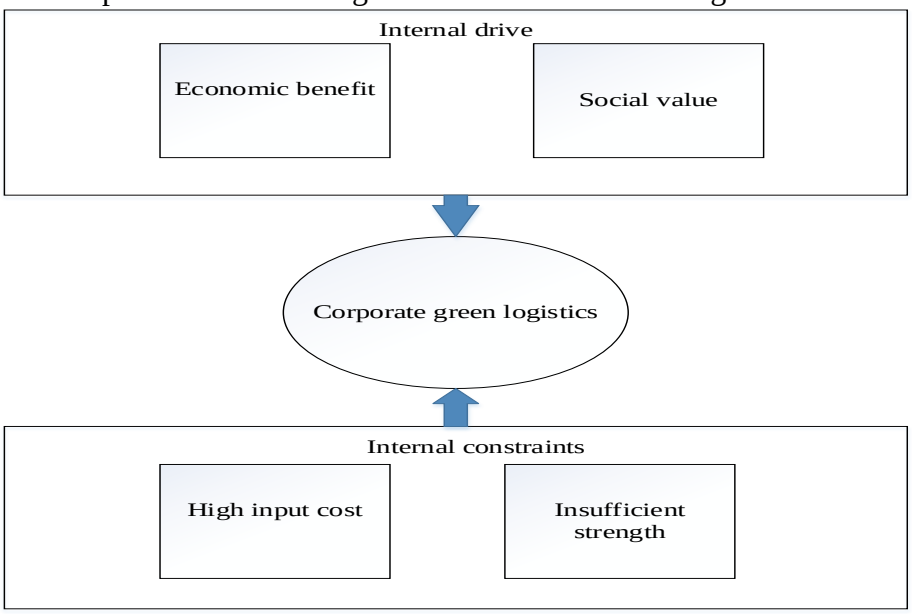

Figure 2 Mechanism of internal factors affecting enterprise green logistics

2.2 Research hypotheses and models

Based on the detailed analysis of the internal and external factors affecting the implementation of green logistics in enterprises, combined with the relevant literature, this paper puts forward the following four research hypotheses, and constructs the model of the relationship between the factors affecting the green logistics of enterprises in Yangzhou and the implementation willingness (Figure 3).

H1: The internal driving of implementing green logistics has a significant positive correlation with the efficiency of green logistics;

H2: The government policy system promotes a significant positive correlation with the efficiency of green logistics;

H3: There is a significant positive correlation between external demand for green logistics and green logistics benefits;

H4: There is a significant positive correlation between green logistics efficiency and green willingness to implement logistics.

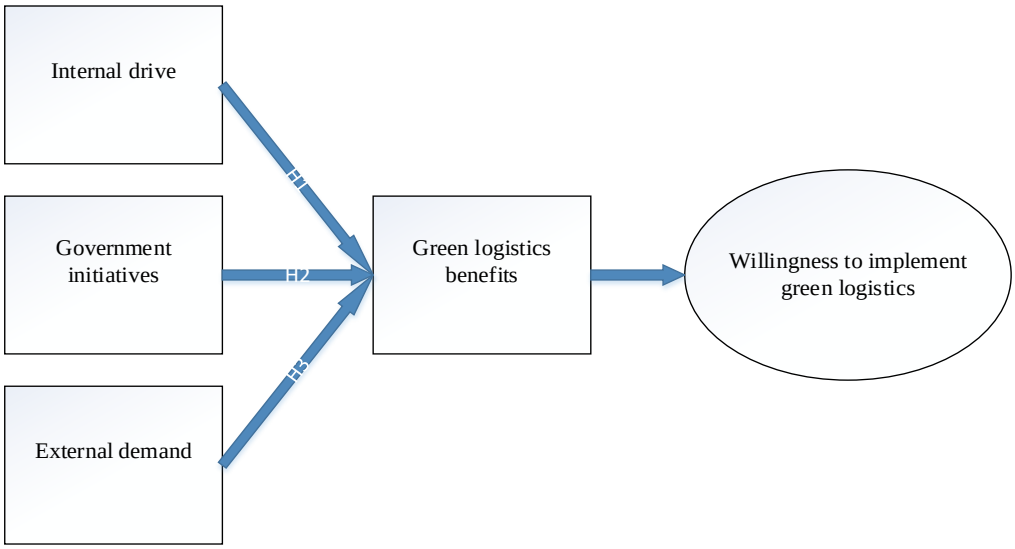

Figure 3 Initial model of the relationship between the factors affecting the green logistics of Yangzhou enterprises and their willingness to implement

3. Questionnaire Design and Data Collection

3.1 Questionnaire design

According to the basic content of green logistics and the successful experience of green logistics management at home and abroad, as well as the opinions of enterprise environmental management experts, the design of the questionnaire is in addition to the basic information of the enterprise. All the items are in the form of Likert 5-level scale. “Very disagree”, “disagree”, “unsure”, “agree” and “very agree” are recorded as 1, 2, 3, 4, and 5. In order to ensure the effectiveness of the measurement tools, the questionnaires in this paper should try to use the items and scales that have been proved effective in previous studies. When the item must be modified, it will be comprehensively referenced to the relevant literature, and will be determined after repeated discussions with relevant experts, scholars and business people. The questionnaire scale mainly includes the following five parts:

(1) The basic information of the companies surveyed mainly includes the internal information of the nature of the enterprise, the current status of the green logistics process, and the current status of

the logistics talent reserve.

(2) External influence factor scale (WB1~WB12). The external influence factors of the enterprise are reflected in the influence of external related subjects, mainly based on the recommendations of Buysse and Verbeke (2003) on green logistics management, and some are based on Javier Gonzalez-Benito and Oscar Gonzalez-Benito (2006) [8]. Part of the research on the factors affecting stress, together with the influencing factors of external related subjects, a total of 12 items.

(3) Internal Influencing Factors Scale (NB1 to NB6). Mainly refer to Paul R. Murphy and Richard F. Poist (2003) for the main reasons for the implementation of environmental management in the United States and Yu Chengxue (2008) industrial enterprise green logistics integration management research project [9], combined In the actual situation of Yangzhou City, the actual development of some items, a total of six items.

(4) Implement the Green Logistics Benefit Scale (XY1 to XY3). Mainly refer to Paul R. Murphy and Riehard F. Poist (2003) and Zhu and Sarkis (2004) research results on corporate environmental behavior, a total of three items.

(5) The implementation of the green logistics willingness scale (YY1 ~ YY5), combined with the actual situation of the enterprise logistics design, completed a total of 5 items.

3.2 Data collection

In order to fully represent the development level of Yangzhou Green Logistics, the research results will be more realistic for the formulation of Yangzhou Green Logistics Policy. This survey randomly selected large, medium and small-scale logistics enterprises in Yangzhou City as the survey object, and mainly conducted on-site investigations. A total of 136 questionnaires were distributed, 130 were collected, 120 valid questionnaires, and the recovery rate was 95.6%. 92.3%.

4. The Results and Analysis

4.1 Analysis of the reliability and validity of the questionnaire

This paper examines the validity of this questionnaire from two aspects: content validity and structural validity [10]. For the content validity, the initial questionnaire is based on the literature analysis, and draws on the relevant research results of domestic and foreign scholars, and discusses and revise the items with experts, scholars, first-line enterprise managers, etc., so that the items in the questionnaire can Fully reflect the actual situation of corporate green logistics. Therefore, the scale of this questionnaire has high content validity.

For structural validity, this paper uses the factor analysis method [11], using KMO test and Bartlett's sphericity test to analyze whether the data is suitable for factor analysis, so as to judge whether the questionnaire has structural validity. The KMO of the four facets of external influence factors, internal influence factors, green logistics benefits and green logistics implementation intentions using SPSS24.0 software were 0.860, 0.831, 0.713 and 0.806, respectively, both exceeding 0.7, which is suitable for factor analysis. At the same time, Bartlett's sphericity test gives a companion probability of 0.000, which is less than the significance level of 0.05, thus rejecting the null hypothesis of Bartlett's test, and considers that the study variables are suitable for factor analysis.

On the basis of the preliminary factor analysis, according to the condition that the common factor variance exceeds 0.4, and the factor load exceeds 0.5, the items that do not meet the conditions such as WB1, WB4, WB5, WB7, XY5 are deleted, and 14 measurement items are obtained. Further, the principal component analysis method is used to extract the common factor. According to the principle that the eigenvalue of the extracted principal component is greater than 1, and rotated by the "maximum variance method", the common factors are composed of the items whose absolute value of the factor load is greater than 0.5. The variance contribution rate and the post-rotation factor load matrix are shown in Tables 1 and 2. It can be seen that the questionnaire has good structural validity.

Table 1 Factor Load Matrix

	Ingredients				
	1	2	3	4	5
WB2	.866				
WB3	.821				
WB6	.761				
WB11			.797		
WB12			.860		
YY1		.779			
YY2		.774			
YY3		.839			
XY1				.694	
XY2				.765	
XY3				.727	
NB1					.575
NB5					.664
NB6					.639

Extraction method: main component.

Rotation method: An orthogonal rotation method standardized by Kaiser.

a. The rotation converges after 8 iterations.

Table 2 Total variance explained

Ingredients	Initial eigenvalues			Extracted square sum loading			Rotating squared sum loading		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.191	58.508	58.508	8.191	58.508	58.508	4.042	28.870	28.870
2	1.381	9.864	68.372	1.381	9.864	68.372	2.664	19.031	47.900
3	1.093	7.810	76.182	1.093	7.810	76.182	1.869	13.348	61.248
4	.596	4.254	80.436	.596	4.254	80.436	1.636	11.683	72.931
5	.538	3.845	84.281	.538	3.845	84.281	1.589	11.350	84.281
6	.488	3.489	87.770						
7	.335	2.394	90.163						
8	.305	2.179	92.342						
9	.226	1.618	93.960						
10	.209	1.493	95.453						
11	.193	1.378	96.831						
12	.183	1.310	98.141						
13	.145	1.034	99.175						
14	.116	.825	100.000						

Extraction method: principal component analysis.

From the analysis results, the selected items can extract 5 common factors, and are appropriately named according to the items covered by the common factors. Factor 1 was named as government initiative, factor 2 was named external demand, factor 3 was named as willingness to carry out, factor 4 was named as benefit, and factor 5 was named as internal drive. The total variance of interpretation of these 5 factors was 84.281%.

In order to verify whether the same factor of each factor in the factor analysis measures the same problem, this paper further uses SPSS24.0 statistical software to analyze the internal reliability of the sample data. The measurement results use Cronbach's α coefficient to detect whether the questionnaire factor has High internal consistency, the results are shown in Table3.

Table 3 Results of factor reliability analysis

Factor	Cronbach's α coefficient
Government initiatives	0.912
External demand	0.833
Willingness to carry out	0.855
Carry out the benefits	0.879
Internal drive	0.837
Overall reliability of the questionnaire	0.949

The closer the α coefficient is to 1, the higher the reliability; generally come(1) Implement and implement ideological education

4.2 Relevant analysis

In this paper, SPSS24.0 software is used to analyze the correlation coefficient of the extracted factors to test whether there is significant correlation between government initiatives, external needs, development benefits, internal driving and willingness to carry out. The results are shown in Table 4. When the Person correlation coefficient is less than 0.4, it indicates that there is a low correlation; when the Person correlation coefficient is 0.4-0.6, it indicates that there is a medium-intensity correlation; when the Person correlation coefficient is above 0.6, it indicates that there is a strong correlation. This shows that there is a significant medium-strength correlation between government initiatives, external needs, development benefits, internal drivers and willingness to carry out.

Table 4 Related analysis results

		Government initiatives	External needs	Willingness to carry out	Carry out the benefits	Internal drive
Government initiatives	Person correlation	1				
External requirements	Person correlation	.576**	1			
Willingness to carry out	Person correlation	.488**	.517**	1		
Carry out the benefits	Person correlation	.838**	.548**	.642**	1	
Internal drive	Person correlation	.727**	.484**	.651**	.850**	1

**. At the 0.01 level (two-tailed), the correlation is significant.

4.3 Model fitting and correction

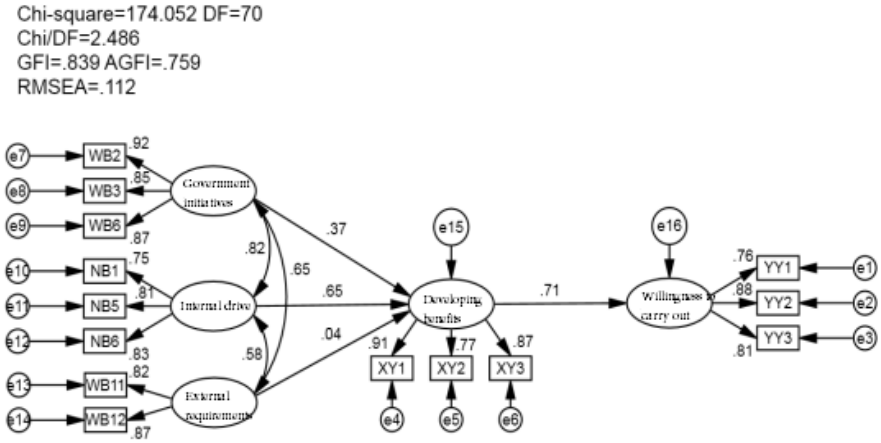

Figure 4 Initial structural model of the relationship between the factors affecting the green logistics of Yangzhou enterprises and their implementation intentions

The structural equation model uses SPSS AMOS21.0 software, using the fixed load method, the

covariance matrix of the questionnaire data is fitted with the hypothetical structural model to obtain the initial structural model and the standardized path of operation. The standardized initial structural model is shown in Figure 4. As shown in Figure 4, the estimated coefficients are shown in Table 5.

Table 5 Initial Model Normalized Path Estimation Coefficient

			Standardized path coefficient	Standard deviation	C.R. value	P value
Carrying out the benefit	<---	Government initiatives	.369	.108	3.419	***
Carrying out the benefit	<---	Internal drive	.737	.132	5.591	***
Carrying out the benefit	<---	External demand	.044	.070	.619	.536
Willingness to carry out	<---	Developing benefits	.728	.100	7.253	***
NB1	<---	Internal drive	1.000			
WB11	<---	External demand	1.000			
XY1	<---	Developing benefits	1.000			
XY2	<---	Developing benefits	.902	.080	11.225	***
YY1	<---	Willingness to carry out	1.000			
YY2	<---	Willingness to carry out	1.398	.149	9.359	***
WB3	<---	Government initiatives	1.000			
WB12	<---	External demand	1.137	.144	7.899	***
XY3	<---	Developing benefits	.988	.068	14.612	***
YY3	<---	Willingness to carry out	1.072	.121	8.845	***
NB6	<---	Internal drive	1.166	.125	9.349	***
WB2	<---	Government initiatives	1.087	.080	13.635	***
WB6	<---	Government initiatives	.960	.078	12.330	***
NB5	<---	Internal drive	1.009	.111	9.101	***

According to relevant scholars' research, the path with CR value greater than 1.96 should be retained. Otherwise, it should be corrected or deleted. It can be seen from Table 4 that “the benefit is <---external demand” (CR value=0.619, P value) =0.536>0.05) The normalized path coefficient has the largest gap with other paths. If the action path does not meet the requirements, it should be deleted.

At the same time, considering the interaction between external demand and the willingness of enterprises to develop green logistics is an important part of this study, so the path of the hypothesis model is appropriately modified: the external demand is revised to have a direct impact on government initiatives and internal drivers. Therefore, the modified model is obtained by indirectly affecting the development benefit. The comparison between the two is shown in Figure 4. Then, the modified structural model is fitted to the overall sample data. According to the evaluation criteria of goodness of fit, the overall fit of the model is optimized. The index value has been further improved. It can be seen from Table 5 that the indicators of the modified model meet the fitting goodness

criteria, and the fitting is good, and it is better than the initial model. It has no further correction and is an ideal fitting model. The model is finally determined. The normalized path estimation coefficients of the modified model are shown in Table 6, and the fitting solution is shown in Figure 5.

Table 6 Corrected model normalized path estimation coefficient

			Standardized path coefficient	Standard deviation	C.R. value	P value
Government initiatives	<---	External demand	1.218	.178	6.834	***
Carrying out the benefit	<---	External demand	1.009	.165	6.127	***
Carrying out the benefit	<---	Government initiatives	.435	.077	5.647	***
Carrying out the benefit	<---	Internal drive	.711	.105	6.767	***
Willingness to carry out	<---	Developing benefits	.732	.101	7.228	***
NB1	<---	Internal drive	1.000			
WB11	<---	External demand	1.000			
XY1	<---	Carrying out the benefit	1.000			
XY2	<---	Carrying out the benefit	.904	.081	11.167	***
YY1	<---	Willingness to carry out	1.000			
YY2	<---	Willingness to carry out	1.397	.150	9.303	***
WB3	<---	Government initiatives	1.000			
WB12	<---	External demand	1.130	.173	6.528	***
XY3	<---	Carrying out the benefit	.984	.069	14.325	***
YY3	<---	Willingness to carry out	1.071	.122	8.796	***
NB6	<---	Willingness to carry out	1.162	.127	9.122	***
WB2	<---	Internal drive	1.079	.079	13.733	***
WB6	<---	Government initiatives	.953	.077	12.403	***
NB5	<---	Government initiatives	1.036	.113	9.181	***

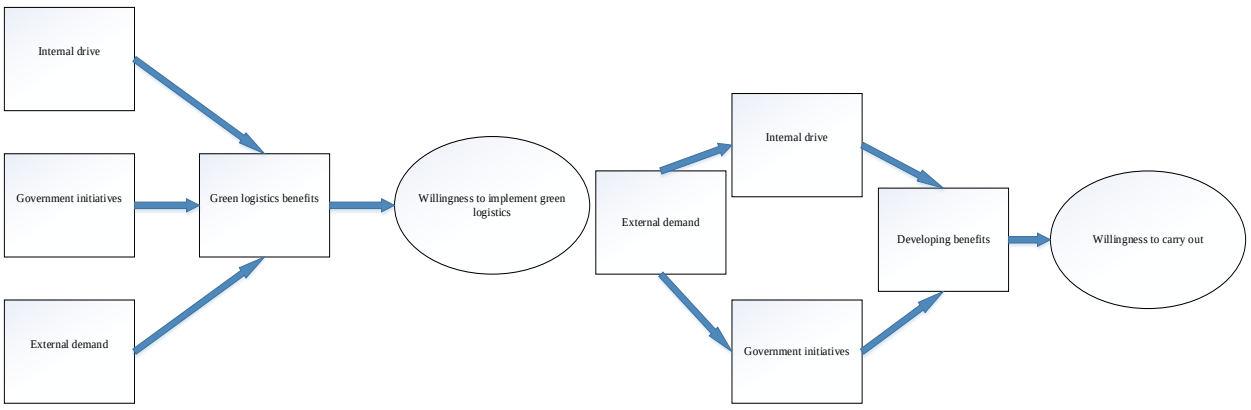

Figure 5 Comparison between the initial model and the revised model

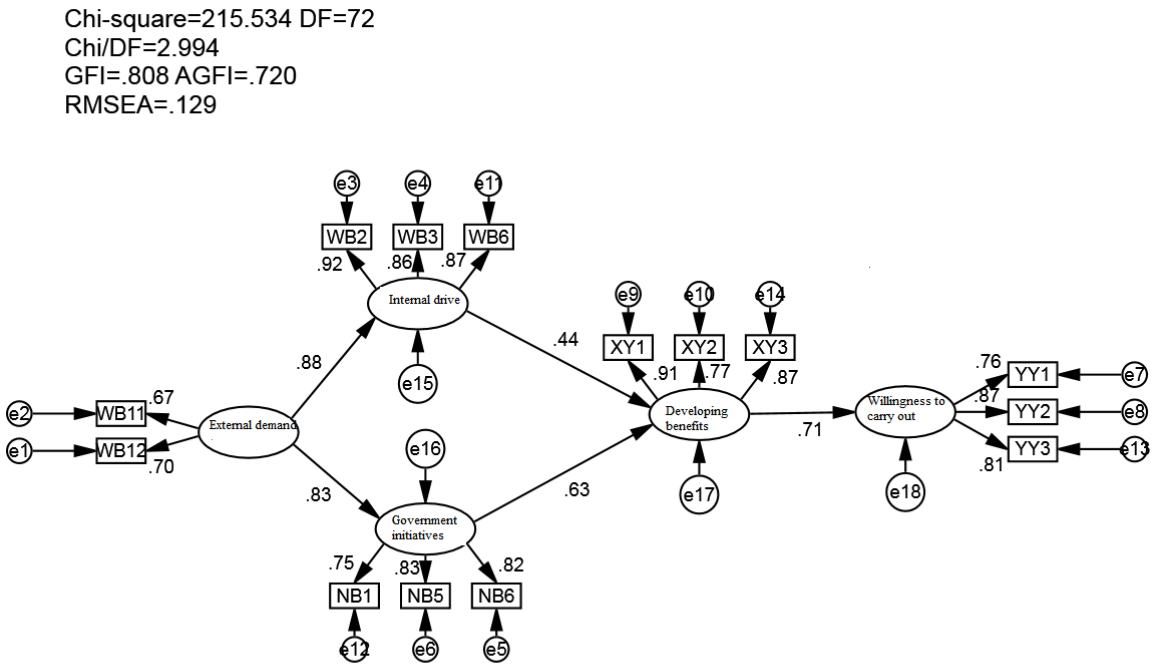

Figure 6 Correcting the results of the model fitting solution

4.4 Analysis of results

In the initial hypothesis of this study, hypothesis 1, hypothesis 2, hypothesis 4 through verification, that is, internal driving, government initiatives, two factors are indirectly affecting the willingness to implement green logistics through the implementation of benefits. Further support for the enterprise as an "economic man", its business goal is to pursue the idea of maximizing profits, and verify that the green logistics efficiency plays a major media role in the positive impact of the internal and external factors of green logistics on the level of green logistics willingness. At the same time, from the fitting results of the model, the driving force of the green logistics development benefit to the green logistics implementation willingness is very significant, and it also shows the important role of the realization of the green logistics development benefit in promoting the implementation of green logistics. Hypothesis 3 is not supported, that is, there is no significant positive correlation between external demand and green logistics. However, in terms of the fitting effect of the integrated initial model and the revised model, external demand has a significant positive correlation between internal driving and government initiatives, that is, external demand is not driven by green logistics benefits, but is implemented by internal driving and government initiatives for green logistics. Willingness has an indirect effect.

Coben (1999) studied the range of path parameters as a reference, that is, the absolute value is greater than 0.5 for large effects, the absolute value is between 0.1 and 0.5 for medium effect, and the absolute value is less than 0.1 for small effects [13]. It can be seen from Figure 4-4 that the structural model has a high fitting effect with the sample data. Further analysis, the indirect effect coefficient of internal driving on the willingness to carry out is 0.45 (0.63×0.71), and the indirect effect coefficient of government measures on the willingness to implement is 0.31 (0.44×0.71). It can be seen that among the factors that positively and indirectly affect the willingness level of green logistics, the internal driving is stronger and the government measures are weaker, indicating that the current government policy system has a limited effect on the green logistics efficiency of enterprises. A reasonably plausible explanation is that China's current policies and regulations on green logistics are still not perfect, and the control methods and implementation efficiency of

policies and regulations need to be improved. The indirect effect coefficient of external demand through government initiatives on the willingness to carry out is 0.27 (0.88×0.44×0.71), and the indirect effect coefficient of external demand through internal driving will be 0.37 (0.83×0.63×0.71), indicating that in reality, External demand will be more willing to influence the internal will of the company to act on green logistics. The impact coefficient of green logistics on the willingness to carry out is 0.71. It can be seen that the driving force of green logistics development to drive green logistics will be very significant, indicating that the improvement of green logistics efficiency has a significant direct effect on the green logistics willingness level. This further illustrates that logistics enterprises are the key hub for the development of green logistics [14].

5. Conclusions and recommendations

From the empirical analysis, it can be seen that the internal driving of logistics enterprises and external related entities (government, market consumers) work together to form a driving force, and the green logistics efficiency as an intermediary to enhance the willingness of logistics enterprises to carry out green logistics. Although the government plays a central role in the development of green logistics, logistics enterprises are the key hub for the development of green logistics. Therefore, in the context of the government's favorable green logistics environment, the first priority is to strengthen the internal driving force for the economic and social value of the development of green logistics, and continuously improve the green logistics infrastructure platform, logistics information platform conditions, green logistics technology. The promotion, while paying attention to the promotion and support of consumers and society, and jointly promote the implementation of green logistics in logistics enterprises [15].

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