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Key Factors Analysis of Green Development of Port Logistics - Based on Method DEMATEL

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Abstract: The green development of port logistics is affected by various factors, it's a complicated system. From the port logistics enterprise, government and external environment these 3 aspects it systematically analyzes influence factors on green port logistics and the relations between each key factor, with the DEMATEL (decision-making and trial evaluation laboratory) method, it quantificationally reveals the complex impact between each factor, and the seasonality and centrality which have influence on the port logistic green development, and finds out the green laws and regulations, policies support, popularity rate of green energy, standards of green port logistics and environment supervision system etc. that restrict the green development of port logistics, then finally points out the central role of the restriction and advocacy when the government is at the earlier stage of the development of the green port logistics, so as to provide the scientific decision basis for promoting the green development of the port logistics industry.

Keywords: Green port logistics; DEMATEL method; Key factors

1. Introduction

The development of port-centered industry was driven by the strategy of marine economy, however, the characteristics of port-centered industry and port shipping determine the pressure of the industry development on the space environment, and the pressure of logistic activities on the ecological environment is more striking. Hence, only follow the road of green development can the port logistics industry take full advantage of resources, reduce the discharge of the waste and promote the running benefit of economy, and then realize the sustainable development of the marine economy.

The green development of port logistics which is a complicated system with multiple dimensions is comprehensively affected by the factors of the government, port logistics enterprises, the society and environment etc. The research on the issue of the green development of port logistics was started abroad earlier; the environmental evaluation and management research of the port logistics construction project was early started in 1960s. For instance, Molmey pointed out that the discharge of ship pollutants was just a part [1] of influences of the port on the surroundings, and Couper, Allen etc. respectively elaborated the environmental issues resulted from the port logistics development and related solutions [2-3]. With the proposal of the strategy of sustainable development of the port in the United Nations Conference on Trade and Development (UNCTAD), Brooke proposed to apply green ideas to establish the environmental impact assessment process for the aggregate analysis [4] of the environmental influence factors due to port logistics. Trozzi and others et al used the diffusion and propagation model comprehensively analyzed the non-green factors [5-6] of the port logistics industry. In the late 1990s, some related articles started to appear in China, such as Fajun Yin, Xiande Kong made a theoretical research [7-8] of the green development of port logistics in the view of sustainable development. Deyou Cao, Ying He started from the actual situation of port planning, basing on the mathematical model established the assessment indicator system related to the green development of port logistics [9-10].

The researches above mostly focus on the analysis of the green development of port logistics from the strategic level, and the articles about the systematic research of the substantive influence factors on developing the green port logistics are still only a few. This article systematically analyzes the influence factors on green port logistics and the relations between each key factor from 3 aspects: the port logistics enterprise, government and external environment.

2. The Establishment of the Key Factor Index System for the Green Development of Port Logistic

With the green concept as the guidance, the green port logistics constructs new port logistics with environmental health, ecological protection, and rational utilization of resources, low consumption and low pollution. Form the environment's perspective, the management of the green port logistics optimizes the port logistics system, and form a management system of the green port logistics in existence with environment. As the key body for carrying out the green development of port logistics industry-the port enterprises will undertake a greater corporate and social responsibility, however, the uncertainty of the green port logistics system is very great, the port logistics enterprises not only have to face the system risk in logistic links of transport, package and delivery etc., but also have to consider the market risk due to the incoordination between the green logistics and external environment, and the nonmarket risk due to the uncertainty of the internal conditions of the port logistics enterprises. Thus it can be seen that the development of the port logistics industry is not a simply problem that can be achieved by an individual enterprise only, but a complex problem, the decisions of which shall be made, considering the economic and management behaviors of each main economy-port logistics enterprise, government and external environment, and it's comprehensively affected by various factors from these 3 aspects mentioned above.

2.1. Influence Factors from the Port Logistics Enterprise

From the technical level, the main way to effectively solve the conflict between the port logistics and the environmental protection is to adopt the containerized transportation, carry out multimodal transport and further optimize the system of collecting and distributing. In addition, the port logistics enterprises also should invest more in the field of green innovation such as 'convert oil to gas', 'portal crane' and 'change oil to power' etc. Besides, 'sustainable transportation' and 'construct a safe, efficient, clean and just transportation system' etc. these concepts and strategic measures which were proposed by other countries like USA and Britain etc. also have significant reference [11] for the development of our nation's green port logistics. It's also an important part of the green port logistics system to actively carry out the reverse logistics. There will have a large number of solid or liquid wastes produced in the process of the operation of the port logistics industry, if they can be recycled and reused, it not only can create economic benefits even more can bring social benefits. Severe lack of logistics talent has already become a bottleneck factor which shall restrict the development of the green port logistics. At the present stage, the workers who undertake the responsibility of logistics management are mostly computer operators and administrative staff, lack of compound talents who know both management and technique. Meanwhile, the informatization of facilities is conductive to solve the internal disorder competition of the port logistics industry, so as to improve the port logistics enterprise operation efficiency and industrial competitiveness.

Moreover, the 'traction' effect of green marketing strengthened the motivation and behavior of the port logistics enterprises to develop green logistics. With the green concept is deeply rooted in the hearts of the people, the change of the lifestyle and the pursuing of the quality of life are booming with "green" product as a representative. It is reported that more than 70% American consumers were willing to pay higher prices for green products in 1998; in Germany about 80% consumers would consider environmental issues [12] when shopping. The green benefits brought by green marketing are guiding the port logistics enterprises carry out a set of green activities, so that the port logistics enterprises can constantly benefit from the increasing trend of 'green demand'.

2.2. Influence Factors from the Government

The government must further attach great importance to the publicity and education of greenization for the port logistics while striving to develop the marine economy, so as to form the priority of resource allocation that can be used for the market orientation of the port logistics greenization. In our country, the operator and consumer's understanding of the port logistics greenization is still in the initial phase. The benefit short-sighted behaviors of the enterprise tend to neglect the negative effects from the port logistics to the environment. Hence, while striving to develop the marine economy, the green port logistics must be understood by lifting to the height of the important part of the strategy of sustainable economic development, this is also the ultimate aim of the development of the modern port logistics industry.

The development of the green port logistics needs perfect environment supervision systems and green laws and regulations. Japanese scholar Zhi Caoyi believes that the government regulation means that the government shall impose restrictions [13] on the activities of the economic subjects which constitute the specific economy, according to certain rules. The objective of the government regulation is that the government imposes restrictions and prohibitions on the logistics behaviors of the port logistics enterprise, and imposes external restrictions and interventions on the activities of the port logistics enterprise. In addition, comparing with developed countries' 2%, our country's share of environmental protection input in GDP is lower; this is not coordinated [14] with the rapid growth economic situation.

The standardization of the green port logistics is the key of the green development of the port logistics. With the rapid development of the port industry in recent years, the problem of the lagged standardized construction of the port logistics is more and more outstanding. In 2013,

the Ministry of Transport issued 'Standard for Green Port Grade Evaluation'; this played an active role in promoting the green development of our country's port logistics industry. However, so far the related standardized construction of the green port logistics is still way behind compared with foreign countries, the amendment of green standardization cannot keep the pace with the demand of the port logistics development, and the related standardization works still lack systematic connections. In the face of the international waves of 'green revolution' and the green trade barrier formed on the basis of the environmental standards competition, our country shall further refine the green standardization design in the entire procedures of the port logistics, link it up with international standards, and promote greenization with standardization.

2.3. Influence Factors from External Environment

The greenization construction needs to green recreate the whole business process of the port logistics enterprise, it requires the enterprise to realize the objective of energy conservation and environment protection, which has both economic attribute and social attribute, besides to gain economic benefits. Currently, the logistics expenses of our country is around18% of GDP, it is 10 percentage points higher than developed countries. According to calculation, a decline of 1 percentage point will save 3000-4000 trillion RMB. The overall trend of the international logistics development is: "Rely on port developed. Near the water can produce", therefore, the key for realizing the objective of reduction of logistics cost lies in the port, the greenization processes in each link of the port logistics shall be speeded up, including the links of effective utilization of green fuel and the timely recycle of waste materials etc. to make the logistics process conform to the economical dual benefit.

The green development of port logistics is an important constituent part of social sustainable development in the end. It emphasizes to adopt the concepts and measures in harmonious coexistence with the environment in the entire process of pot logistics activities, and reduce environmental hazards due to port logistics activities, avoid wasting of resources, so that the ecosystem and economic system can be organically composed to ecological economic system. With the development of global economic integration, the 'green trade barrier' is emerging gradually, Europe and America and other developed countries propose higher requirements to import products and circulation channels, thus the port logistics industry in the initial phase is in face of great pressures from national and international adversity. At this time, while keep the rapid growth of the total amount of social logistics, some green measures like promote the utilization rate of raw materials and reduce environmental pollutions etc. shall be carried out effectively, and speed up the process of integrating the green port logistics into the sustainable development.

According to the comprehensive analysis above, the target system of key influence factors on port logistics is shown in Figure 1.

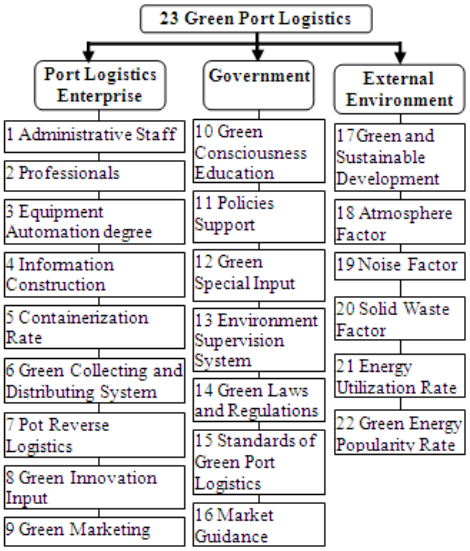

Figure 1. The target system of key influence factors on port logistics

3. Conclusions Relationship Analysis among the Factors Affecting Green Port Logistics

The influential relationship among all factors was analyzed based on the problems faced in the development of Green Port Logistics. For example, the "Green Port Logistics Standards" will affect the "Containerization Rate", "Green Collection and Distribution System", "Information Construction", "Environmental Regulatory System" and other factors, and the "Government Support" will affect "Environmental Regulatory System", "Green and Sustainable Development", "Green energy Penetration" and other factors. The relationship among the factors was determined by talk and analysis and widely collecting the ideas of experts to form the influential relationship system which affecting the green port logistics development (See Table 1) that the value of Line i and Row j is 1 if the factor i has impact on j and 0 if not.

Based on the above analysis available, due to the direct or indirect impact on the green port logistics development under the interactive influence and control of all factors affecting the green port logistics, we should put great emphasize on which factor has a bigger impact and which factor has a less one that we feel difficulties in judgment so as to development the relevant policies with targets and effectively solve the existing problems in the development process of the green port logistics. In order to solve the above problems, the impact of all factors on the green port logistics development and its importance

during the process were analyzed given the key impact factors analysis model of the green port logistics based on DEMATEL Method.

Table 1. The Influential Relationship Among The Factors Affecting The Green Port Logistics

NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
4	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0
7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
10	0	0	0	0	1	1	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0
11	0	1	0	1	0	0	1	0	0	1	0	1	1	1	0	1	0	0	0	0	0	1	1
12	0	0	0	0	1	1	0	1	0	0	0	0	0	0	1	0	1	0	1	0	0	1	1
13	0	0	0	0	1	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	1	0	1
14	0	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1	0	1	1	0	0	1	1
15	0	1	0	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	1	1
16	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
17	0	0	0	0	1	1	1	1	1	1	0	1	0	1	0	1	0	0	0	0	1	1	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4. Analysis Model of Key Factors Influencing Green Port Logisitcs Development

With the help of method DEMATEL, we can analyze the comprehensive impact relations between the indicators and the impact relationship between the indicators and the green port logistics thus to find the key factors affecting the green port logistics [15]. The method is raised by Institute Bottelle of America using graph theory and matrix tools to make systematic analysis [16]. It is possible to calculate the impact level of each factor on other factors and vice verse through the logical relationship between the factors in system and the direct impact matrix so as to calculate the centrality and the reason degree of each factor.

The key impact factors analysis modeling method of the Green Port Logistics based on Method DEMATEL is as the following.

In the impact factors of the Green Port Logistics, each indicator in the indicator system affecting the Green Port Logistics is a indicator directly or indirectly affecting the green nature of the port logistics and as a general factor, the "Green Port Logistics" is set as $F_1, F_2, .., F_{23}$.

Determination of the relationship among these factors. On the basis of widely collecting and organizing related information, the impact relationship among all factors during the process of the green port logistics development was analyzed and its relationship graph was created. If factor F_i has direct impact on F_j, there should be an arrow from F_i to F_j, namely if the arrow directes from F_i to F_j means the factor F_i has direct impact on F_j.

Direct impact of initialization on matrix. It refers to the direct impact relationship among the factors shown by the matrix and set with n-matrix of $X = (a_{ij})_{n\times n}$ that $a_{ij} = 1$ will be defined if F_i has a direct impact on F_j and otherwise $a_{ij} = 0$ (see Table 1).

Normalization of the direct impact matrix. Sum all rows of X, set the row and the maximum as max and set $X = X / \max$.

Calculation of the comprehensive impact matrix. In order to analyze the indirect impact relationship among these factors for seeking a comprehensive impact matrix T. Here $T = X + X^2 + \ldots + X^n = X(1-X)^{-1} = (t_{ij})_{n\times n}$.

Analysis of impact factors. To evaluate tij of T, and figure out the degree of impacting and being impacted as well as the centrality and the reason degree of each factor. tij refers to the direct and indirect impact extent brought from i to j or the comprehensive impact value from j to i. $T_r = (T_r(1), T_r(2), .., T_r(n))^T$, the sum of factors of all rows in T indicates the comprehensive impact value of the corresponding factor in each row to other factors is called impact degree. $T_c = (T_c(1), T_c(2), .., T_c(n))^T$, the sum of factors of all rows in T indicates the comprehensive impact value of the corresponding factor in each row given by other factors.

The centrality of Fi is $M_i = T_r(i) + T_c(i)$, indicating its position and importance in the evaluation indicator system. The reason degree of Fi is $M_i = T_r(i) - T_c(i)$ and when the reason degree Ri is more than 0, that indicates the factor has a big influence on others and thus called the reason factors; and when the reason degree Ri is less than 0, that indicates the factor receives a big influence from others and thus called the result factors.

By the above calculations it can be calculated the impact extent of each impact factor on the green port logistics according to the extent of impacting and being impacted and the importance of each factor in the influential factors indicators system of the green port logistics according to the centrality and furthermore the interactive relationship among all factors according to the reason degree.

5. The Key Impact Factors Analysis in the Green Port Logistics Development

According to the direct impact relationship in Table 1, a comprehensive impact matrix among all factors in the green port logistics can be calculated and the impact extent of each factor on the green port logistics and its centrality and reason degree which are shown in the Table 2.'

5.1. Level Analysis of the Impact Factors

Based on the reason degree indicator of each factor, the impact factors of the green port logistics are divided into two categories: ①The reason factor. According to the scale of the reason degree there should be policy support, green and sustainable development, green laws and regulations, environmental regulatory system, green con-

sciousness education, management personnel, information technology construction, professional technological personnel, the green port logistics and so on. These factors have direct impact on the green port logistics and are the active factors in promoting its development which should be enforced. ②The result factor. According to the number of the absolute value of the reason degree there should be energy use efficiency, containerization rate, green collection and distribution system, green energy penetration, atmospheric factors, port reverse logistics, market guidance and other factors. These factors which are affected by others give impact on the development of the green port logistics and will produce the impact factors of this kind of factors, and is expected to promote the green development of the port. Taking the green collection and distribution system as the example, the overall development of the port is promoted by those factors which have bigger influence on this factor such as professional technological personnel, device automation degree, green special investment, environmental regulatory system, green port logistics standards, green energy penetration and others.

Table 2. The impact extent of all factors in the green port logistics on the overall target and its reason degree and centrality degree (x100)

NO	1	2	3	4	5	6	7	8	9	10	11	12	13
1	0	1.36	2.97	0	10.06	8.51	5.92	3.43	3.13	1.36	0	4.35	0.94
2	0	1.26	2.75	0	9.3	7.87	5.48	3.18	2.9	1.26	0	4.02	0.87
3	0	0.74	1.61	0	5.44	4.6	3.2	1.86	1.69	0.73	0	2.35	0.51
4	0	0.81	1.76	0	5.97	5.05	3.51	2.04	1.85	0.81	0	2.58	0.56
5	0	0.96	2.09	0	7.07	5.97	4.16	2.41	2.2	0.95	0	3.05	0.66
6	0	0.57	1.24	0	4.21	3.56	2.48	1.44	1.31	0.57	0	1.82	0.39
7	0	0.67	1.46	0	4.94	4.18	2.91	1.69	1.54	0.67	0	2.13	0.46
8	0	0.3	0.65	0	2.19	1.85	1.29	0.75	0.68	0.3	0	0.95	0.2
9	0	1.35	2.94	0	9.84	8.41	5.85	3.39	3.1	1.34	0	4.3	0.92
10	0	2.24	4.88	0	16.53	13.98	9.73	5.64	5.15	2.23	0	7.14	1.54
11	0	4.65	10.14	0	34.32	29.02	20.2	11.71	10.69	4.64	0	14.83	3.19
12	0	1.89	4.11	0	13.91	11.77	8.19	4.75	4.33	1.88	0	6.01	1.29
13	0	2.94	6.41	0	21.71	18.36	12.78	7.41	6.76	2.93	0	9.38	2.02
14	0	3.87	8.44	0	28.59	24.17	16.83	9.76	8.9	3.86	0	12.35	2.66
15	0	2.06	4.49	0	15.22	12.87	8.96	5.19	4.74	2.05	0	6.57	1.42
16	0	0.47	1.03	0	3.47	2.93	2.04	1.18	1.08	0.47	0	1.5	0.32
17	0	4.15	9.05	0	30.64	25.91	18.04	10.46	9.54	4.14	0	13.24	2.85
18	0	0.97	2.12	0	7.18	6.07	4.23	2.45	2.24	0.97	0	3.1	0.67
19	0	0.64	1.39	0	4.72	3.99	2.78	1.61	1.47	0.64	0	2.04	0.44
20	0	1.2	2.62	0	8.87	7.5	5.22	3.03	2.76	1.2	0	3.83	0.82
21	0	0.23	0.5	0	1.69	1.43	0.99	0.58	0.52	0.23	0	0.73	0.16
22	0	0.85	1.85	0	6.25	5.28	3.68	2.13	1.95	0.84	0	0.27	0.58
23	0	0	0	0	0	0	0	0	0	0	0	0	0
Column sum	0	34.18	74.5	0	252.22	213.28	148.47	86.09	78.54	34.07	0	106.54	23.47

NO	14	15	16	17	18	19	20	21	22	23	Line Sum	Reason Degree	Centrality Degree
1	3.02	4.4	5.04	0	8.02	3.86	6.6	9.58	9.04	8.41	100	100	100
2	2.79	4.07	4.66	0	7.41	3.57	6.1	8.86	8.36	7.52	92.23	58.03	126.43
3	1.63	2.38	2.72	0	4.33	2.09	3.56	5.18	4.88	4.4	53.9	-20.6	128.4
4	1.79	2.61	2.99	0	4.76	2.29	3.91	5.69	5.36	4.83	59.18	59.18	59.18
5	2.12	3.09	3.54	0	5.63	2.71	4.63	6.73	6.35	5.71	70.03	-182.17	322.23
6	1.26	1.84	2.11	0	3.36	1.62	2.76	4.01	3.79	3.41	41.75	-171.55	255.05
7	1.48	2.16	2.48	0	3.94	1.9	3.24	4.71	4.44	4	49	-99.5	197.5
8	0.66	0.96	1.1	0	1.75	0.84	1.44	2.09	1.97	1.77	21.74	-64.35	107.83
9	2.98	4.34	4.98	0	7.92	3.82	6.52	9.47	8.93	8.04	98.54	20	177.08
10	4.96	7.22	8.28	0	13.17	6.35	10.83	15.74	14.85	13.36	163.82	129.72	197.92
11	10.2	15	17.2	0	27.35	13.18	22.5	32.69	30.84	27.76	340.2	340.2	340.2
12	4.17	6.08	6.97	0	11.09	5.34	9.12	13.25	12.5	11.25	137.9	31.4	244.4
13	6.51	9.49	10.88	0	17.3	8.34	14.23	20.68	19.51	17.55	215.19	191.69	238.69
14	8.57	12.49	14.32	0	22.78	10.98	18.74	27.23	25.69	23.12	283.35	207.75	358.95
15	4.56	6.65	7.62	0	12.12	5.84	9.98	14.49	13.67	12.3	150.8	40.6	261
16	1.01	1.52	1.74	0	2.76	1.33	2.27	3.31	3.12	2.81	34.36	-92.04	160.76
17	9.19	13.39	15.35	0	24.41	11.77	20.09	29.18	27.53	24.78	303.71	303.71	303.71
18	2.15	3.14	3.6	0	5.72	2.76	4.71	6.84	6.45	5.81	71.18	-129.82	272.18
19	1.42	2.06	2.36	0	3.76	1.81	3.09	4.49	4.24	3.82	46.77	-50.09	143.63
20	2.66	3.87	4.44	0	7.06	3.41	5.81	8.44	7.97	7.17	87.88	-77.42	253.18
21	0.51	0.74	0.84	0	1.34	0.65	1.11	1.61	1.51	1.36	16.73	-223.47	256.93
22	1.87	2.73	3.13	0	4.98	2.4	4.1	5.95	5.61	5.05	59.5	-167.1	286.1
23	0	0	0	0	0	0	0	0	0	0	0	-204.1	204.2
Column sum	75.6	110.23	126.35	0	200.96	96.86	165.34	240.22	226.61	204.23	-	-	-

According to the order of the centrality indicators, there should be green laws and regulations, policy support, containerization rate, green and sustainable development, green energy penetration, green port logistics standards, green collection and distribution system, green special investment, environmental regulatory system. This indicates that under an immature development of the green port logistics environment, the constrain of the relevant laws will urge the logistics enterprises to actively face with the economic crisis triggered by energy and environment problems and develop a green port logistics planning system adaptable to the sustainable development needs. Therefore, the government should develop the relevant laws and regulations, encourage the port logistics enterprises to increase the green extent in the chain of the logistics and the special green investment, make efforts on improving the living environment of the surroundings, strengthen the green ideas in people's minds so as to create an environment for implementing the green port logistics. On the other hand, the industry association led by China Federation of Logistics and Purchasing should strengthen the publicity and diffusion of green port logistics ideas, develop the green port logistics standards in a broader scope and contents to catch up with the standards in Europe and other advanced countries. In addition, the environmental departments should strengthen supervision, prompting the improvement of the port logistics automation and information technologies level to transform the device with high energy consumption and waste into a new type of port storage and transportation equipment with low energy consumption and waste, in order to improve the green energy penetration.

5.2. Level Analysis of the Port Logistics Enterprises, Government and External Environment

Sum the impact extent of the indicators contained in the port logistics enterprises, government and external environment on the green port logistics and its reason degree and centrality as the corresponding indicators of the port logistics enterprises, government and external environment which is shown in the Table 3.

Table 3. The impact extent of the indicators contained in the port logistics enterprises, government and external environment on the green port logistics and its reason degree and centrality degree

Indicators	Impact extent	Reason degree	Centrality degree
Port logistics enterprises	40.05	-300.96	1473.7
Government	113.38	849.32	1801.92
External Environment	50.8	-548.29	1719.83

It can be seen from the above that, the government has the biggest impact on the green port logistics, followed by the external environment and the port logistics enterprises. That the government reason degree is more than 0 indicates that the government plays a key role in promot-

ing the green port logistics development while under the pressure of the environment and energy, the port logistics companies are being transformed from the passive recipients to active practitioners. From the centrality of the three, the government is the biggest, followed by the external environment and port logistics enterprises,. Therefore, the government plays a core role of constrain and advocating in the early term of the green port logistics while the port enterprises are the key hubs in the development of the green port logistics.

6. Conclusions

Faced with the double pressure from the environment and resources, the sustainable development will inevitably require the greenization in the material circulation while the increasingly prominent role in the social stream of the port logistics makes the green development become a major trend. However, the green development is not only limited to the device innovation and the optimization of transport routes, and receives the combined effects of many factors including the port logistics business, government and the external environment. Based on the above-mentioned three aspects, the paper has systematically analyzed the impact factors of green port logistics and formed a relatively perfect key factors indicator system of the green port logistics. It has quantitatively revealed the comprehensive impact between factors and the impact degree on the green port logistics and its reason degree and centrality, found the central issues in the green port logistics, namely the green laws and regulations, policy support, containerization rate, penetration of green energy, green port logistics standards, green collection and distribution system, green special investment, environmental monitoring system and indicate the key role played by the government in the constrain and advocating in the early term of the green port logistics by the analysis from the level of the port logistics enterprises, government and external environment and develop the measurements to look forward to providing a basis for decision-making to further promote the sustainable development of the marine economy.

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