Construction of Reverse Logistics Evaluation System in Cosmetics Industry

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Abstract

With the rapid development of the economy and e-commerce, and the improvement of per capita consumption levels, more and more consumers are looking for personalized products, and consumers are increasingly demanding cosmetics. In addition, cosmetics consumption in emerging markets in the Asia-Pacific region, led by China, is proliferating. In 2013, China's cosmetics market surpassed Japan, becoming the second-largest cosmetics consumer in the world, accounting for 14% in 2019. In addition, the packaging cost of cosmetics accounts for a large part of its operating cost, and according to Estee Lauder's successful case, its reverse logistics system saves the company significant cost and improves its logistics efficiency. Therefore, by analyzing 211 sets of data of 21 domestic cosmetics enterprises in 10 years, this paper establishes an evaluation system of domestic cosmetics reverses logistics to effectively evaluate the logistics efficiency of China's cosmetics industry.

Keywords*: Cosmetics, Reverse logistics, Evaluation system*

I. The present situation of the cosmetics industry in the world and China

Cosmetics arose because of people's demand for beauty when the economy developed to a certain extent. According to Euromonitor data, in 2019, the global cosmetics market has reached 499.6 billion US dollars, showing a slow-growth trend in recent years. Among them, the emerging market led by China has become the second-largest consumer of cosmetics in the world, with a year-on-year growth rate of 13.84% in 2019, which is higher than the global growth rate[1]. From the perspective of the domestic cosmetics market, with the steady growth of the domestic economy and the continuous improvement of people's consumption levels, the cosmetics industry is growing rapidly. According to Euromonitor data, the scale of China's cosmetics market doubled from 184.5 billion yuan to 477.7 billion yuan in 2019, with a CAGR of 10%[1]. From the perspective of per capita cosmetics consumption, Hong Kong, Japan, and Norway rank the top three, while the Chinese mainland's per capita consumption is only US$ 50, which is lower than that of developed countries. With the improvement of per capita consumption level, the cosmetics industry has broad space[1].

From the relevant data of China's National Bureau of Statistics, the retail sales of cosmetics in China reached 299.2 billion yuan in 2019, and we assume that the retail markup rate is 8 times[2]. Taking Proya, a cosmetics listed company, as an example, its gross profit margin is about 61%-64%, and its packaging cost accounts for about 61% of its operating cost[3]. Based on this, it is estimated that the scale of China's cosmetics packaging market is about 8.67 billion yuan, which will continue to maintain a high growth rate in the future[3].

II. The Definition and Development of Reverse Logistics

Reverse logistics is a process of planning, implementing, and controlling raw materials, semi-finished products, finished products, and related information from the consumer end to their initial point with high efficiency and low cost. Its purpose is to regain value or properly handle it, contrary to the traditional forward logistics[4]. In short, Its main activities and functions include remanufacturing, landfill, trimming, recycling, repackaging, and reprocessing[4]. However, on the whole, reverse logistics mainly pursue the coordination of efficient use of

products and materials in the whole product life cycle. In addition, reverse logistics can be divided into narrow sense and broad sense.

Reverse logistics in a narrow sense refers to activities such as regeneration, waste disposal, and hazardous materials management[4]. It classifies, processes, and decomposes the components with reuse value in waste, making them become useful resources and re-flow into the fields of production and consumption. Generalized reverse logistics includes all logistics activities such as resource-saving, material reuse, waste disposal, regeneration, and replacement. Is a broader perspective[4]. Due to the high uncertainty of reverse logistics, the complexity of the operation, and the difficulty of implementation, there are still some obstacles in the implementation of reverse logistics at present.

III. The Example of Estee Lauder

According to the case, the annual sales of Estee Launder, a world-famous cosmetics brand, is as high as 4 billion US dollars. However, its annual products due to returns, overproduction, scrapping, and damage are also impressive, reaching 190 million US dollars, accounting for about 4.75% of the sales[5].

Facing the vast profit loss caused by neglecting reverse logistics, Estee Lauder decided to improve its reverse logistics management system. Vaidyanathan Jayaraman and Luo Yadong of the School of Business Administration of Miami University quoted Estee Lauder's strategic management of the regression process in the latest issue of Academy of Management Perspectives. In the first year of investing $1.3 million to build and purchase scanning systems, business intelligence tools, and databases for reverse logistics, Estee Lauder can significantly reduce the proportion of such goods discarded in landfills and save $500,000 in labor costs[6]. It has set up a production line worth US$ 250 million to recycle cosmetics and sell them to shops or retailers in developing countries[6]. These are the cost values that can only be produced by reducing staff and administrative expenses before. After that, the reverse logistics system evaluated more than 24% of Estee Lauder's returns and found that the products that can be redistributed are 1.5 times those that need to be returned[6]. As a result, it saves Estee Lauder a labor cost every year. At the same time, the system can greatly improve the recognition accuracy of products beyond the shelf life. In 1999, Estee Lauder destroyed 27% of the returned goods because it exceeded the shelf life[6]. In 1998, the proportion was 37%[5]. According to the forecast of Estee Lauder's reverse logistics department, in the next few years, as long as the information system and operation system can identify products that have passed the shelf life based on stricter return time, the destruction rate of products may be wholly reduced to below 15%[5].

Therefore, whether to apply reverse logistics is very important for the development of cosmetics companies in the industry. Through data analysis, the evaluation system of domestic cosmetics reverse logistics will be established to effectively evaluate the performance of domestic cosmetics companies in reverse logistics.

IV. The Establishment of Evaluation System

(1) Data source and variable setting

In order to study the impact of reverse logistics on the logistics efficiency of cosmetics enterprises, logistics efficiency coefficient (E)is selected as the dependent variable, warehousing level (W), delivery time (D), logistics loss rate (L_1) and logistics cost (L_2) as the control variables, and whether reverse logistics system is used (R) as the explanatory variable and numerical processing is carried out, where 1 means to use reverse logistics system and 0 means not to use it. Data comes from the logistics information network and Wonder, 211 sets of data of 21 domestic cosmetics enterprises in 10 years.

Warehouse level: Warehouse level reflects the service level and quality of logistics warehouse in a certain period. Generally, it is expressed as the percentage of supply to demand[7]. How to improve the storage level is the crucial factor to improve the economic benefits of enterprises, which is mainly reflected in three aspects: inventory accuracy, inventory volume ratio, and operational efficiency.

Delivery time: Logistics delivery time refers to the time when the distribution center reasonably controls the

incoming, in-stock, and outgoing time of products through scientific management methods and appropriate stock. And time is an intuitive embodiment of logistics efficiency.

Logistics loss rate: during the transportation of goods, some losses will occur due to various reasons, such as wear, physical collision damage, volatilization of volatile materials, leakage of liquid materials, etc. For different materials, the national or industry standards stipulate the loss rate under different modes of transportation. For the damage caused within the scope of the loss rate, the transportation service organization shall not bear the responsibility but shall be paid by the material owner or the transportation requester. Because of the particularity of cosmetic packaging materials, the reduction of loss rate can greatly reduce the company's losses, thus improving efficiency.

Logistics costs the sum of human resources, financial resources, and material resources spent in the physical movement of products, such as packaging, loading and unloading, transportation, storage, and distribution processing. Modern logistics costs have a more comprehensive range, which runs through the whole process of business activities, including all logistics costs from the beginning of raw material supply to the delivery of goods to consumers. Cost is also a vital factor reflecting the advantages and disadvantages of a logistics system.

(2) Data Analysis

Tab 1: The correlation

The correlation							
		Logistics efficiency coefficient	Warehousing level coefficient	delivery time	loss rate	Logistics distribution cost	Whether to use reverse logistics
Logistics efficiency coefficient	Pearson correlation	1	.305**	-.169*	.360**	.600**	0.184
	Significance (double tail)		.000	.014	.000	.000	0.007
	number of cases	210	210	210	210	210	210
Warehousing level coefficient	Pearson correlation	.305**	1	.433*	-0.112	248**	-.64**
	Significance (double tail)	0.000		.000	0.107	.000	.000
	number of cases	210	210	210	210	210	210
delivery time	Pearson correlation	-.169*	.433**	1	.043	.140*	-32**
	Significance (double tail)	0.014	.000		0.537	.043	0.000
	number of cases	210	210	210	210	210	210
loss rate	Pearson correlation	.360**	-0.112	.043	1	.587**	.193**
	Significance (double tail)	0.000	0.107	0.537		.000	.005
	number of cases	210	210	210	210	210	210
Logistics distribution	Pearson correlation	.600**	.248**	.140*	.587**	1	0.102

	Significance (double tail)	0.000	.000	0.043	.000		.140
	number of cases	210	210	210	210	210	210
Whether to use reverse logistics	Pearson correlation	.184**	-.640**	-.323**	.193**	.102	1
	Significance (double tail)	.007	.000	.000	.005	.140	
	number of cases	210	210	210	210	210	210

* * at level 0.01 (double tail), the correlation is significant.
* at level 0.05 (double tail), the correlation is significant.

Through the Person correlation coefficient, it can be found that the dependent variable has a significant correlation with the independent variable, and the correlation coefficient among each variable is less than 0.8, which can eliminate the collinearity effect and carry out further regression model.

Tab 2: Input/remove variables

Input/remove variables[a]			
model	Input variable	remove variable	method
1	Whether to use reverse logistics, distribution cost, distribution time, attriation rate, warehousing level coefficient[b]	-	input

a. Dependent variable: logistics efficiency coefficient
b. All requested variables have been entered.

Tab 3: Model summary

Model summary				
model	R	R^2	R square after adjustment	Error in standard estimation
1	.784[a]	0.615	.606	.9731461921

a. Prediction variables :(constant), whether to use reverse logistics, distribution cost, delivery time, loss rate, warehousing level coefficient

Tab 4: ANOVA

ANOVA[a]						
model		quadratic sum	degree of freedom	mean square	F	significance
1	regression	308.899	5	61.780	65.236	.000[b]
	residual error	193.191	204	.947		
	Total	502.090	209			

a. Dependent variable: logistics efficiency coefficient
b. Prediction variables :(constant), whether to use reverse logistics, distribution cost, delivery time, loss rate, warehousing level coefficient

The regression equation as a whole passed the F ratio test, and the F statistic was 65.236, with a significance of 0. The overall goodness of fit of the model is good, and the r square is 0.615.

Tab 5: Coefficient

Coefficient[a]							
	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	standard error	Beta	t	significance	Objective differences	VIF
(constant)	-4.169	.774		-5.384	.000		
Warehousing level coefficient	.831	.083	.676	9.986	.000	.412	2,429
delivery time	-.579	.074	-.379	-7.801	.000	.798	1.253
loss rate	.843	.287	.168	2.934	.004	.575	1.739
Logistics distribution cost	1.103	.198	343	5.569	.000	.496	2.015
Whether to use reverse logistics	1.401	.199	427	7.024	.000	.510	1.960

a. Dependent variable: logistics efficiency coefficient

All independent variables are significant at the confidence level of 5%, and warehousing level, loss rate, distribution cost, and whether to adopt reverse logistics are positively correlated with logistics efficiency. There is a negative correlation between delivery time and logistics efficiency, which accords with common sense. Explain the inverse Flow can improve the logistics efficiency of cosmetics enterprises, and using a reverse logistics system can improve the logistics efficiency by about 1.401. In addition, increasing logistics costs, lowering loss standards, and improving storage levels can also improve logistics efficiency. However, from the perspective of enterprises, it is still necessary to consider whether to adopt a reverse logistics system in combination with a cost-benefit ratio, and relevant variables can be used for further study. Generally speaking, cosmetics enterprises are suitable to adopt reverse logistics mode.

Therefore, the following model is obtained to evaluate the reverse logistics system of the domestic cosmetics industry,

$E=0.676W-0.379D+0.168L_1+0.343L_2+0.427R$

V. Countermeasures

Domestic cosmetics companies can implement a reverse logistics system through the following three points.

(1) Determine whether to undertake the main operation of reverse logistics[8]

Enterprises should decide whether to outsource reverse logistics business to professional third-party service providers to concentrate on the main business to gain core competitiveness and reduce risks. Or increase investment in research and development of their own reverse logistics system, and achieve comprehensive control.

(2) Strengthen the construction of enterprise reverse logistics informatization

Enterprises should increase the construction and investment of logistics information infrastructure, purchase information technology software and hardware infrastructure, and establish a safe, stable, and open e-commerce application information network system based on clarifying their own needs.

(3) Improve the management level of enterprises to return products

Enterprise managers should pay more attention to reverse logistics, develop management systems and reverse

logistics systems, and improve product turnover and processing efficiency through the management and control of logistics, information flow, and capital flow.

V. Conclusion

Since the research on reverse logistics in China is in its initial stage, the application of the reverse logistics evaluation system will help all sectors of society realize the necessity of reverse logistics to improve logistics efficiency, thus vigorously promoting the rapid development of reverse logistics in China[9]. At the same time, China's current policies on implementing reverse logistics have not been perfected, which makes the initial investment of enterprises too large and can't achieve direct benefits in the short term. Therefore, the enthusiasm for implementing reverse logistics is not high, which makes the implementation of reverse logistics slow in China.

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