



A Study on Association between Reasons of Reducing Corporate Logistics Costs and Company Classification^{*}

Dong Bin JEONG

Professor, Department of Information Statistics, Gangneung-Wonju National University,
Gangneung, Korea E-mail: dj@gwnu.ac.kr

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Abstract

Purpose – The purpose of this study is to establish the government's logistics policy by calculating the logistics cost of the company and grasping the management status, to reduce the logistics cost of the related companies and to provide basic statistical data necessary for the management strategy. This work examines some associations between reasons for reducing corporate logistics costs (RCLC) and corporate classification such as industry and sales size.

Research design, data, and methodology – The survey was conducted in 2018 for 2,000 companies based on the business of mining, manufacturing and wholesale and retail industries since 2010. The survey population is 94,976, of which 92,708 are small and medium enterprises and 2,268 are large corporations. The association among factors may be statistically and visually explored by using chi-squared test and correspondence analysis.

Result – This study reveals the association between reasons for RCLC and corporate classification and properties and closeness that exist between the categories of each factor can be mined.

Conclusion – As a task to reduce logistics costs of industrial products, expansion and operation of joint logistics business, establishment of cooperative logistics network, and establishment of ordinance on support for smart distribution logistics can be proposed.

Keywords: Association, Corporate Logistics Costs, Industry, Sales Size

JEL Classification Code: C40, P42, M20, Y10.

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1. Introduction

According to a survey conducted by the Federation of Korean Industries on 1,000 exporters, exporting large corporations are expected to increase their shipping logistics costs by an average of 30.9% in the first half of 2021, followed by an increase of 23.8% in the second half of the year, and companies are expected to prolong the normalization period of shipping logistics costs. As logistics costs increase, companies are experiencing a decrease in operating profit (38.9%), a delay-related cost increase (36.2%), a deterioration in product price competitiveness (22.2%), and a disconnection of customers (2.7%). Seven out of ten exporting large corporations are expected to continue to rise in logistics costs due to soaring shipping freight rates until at least June 2022.

The Korea International Trade Association recently conducted an Export-Import Logistics Survey on 144 export companies in Gwangju and Jeonnam, and found that exports of many companies increased (59%) in the first half of 2021 compared to the first half of 2020, but logistics costs have risen sharply, causing losses. Although the export situation seems to have improved relatively, the burden of import and export logistics costs felt by companies is serious. Since logistics costs have increased five times, the more exports are damaged, and 26% of companies account for 30% of logistics costs, which is expected to deteriorate in the second half of 2021 due to logistics shortages in one of the three places.

Due to the spread of the new Corona 19, aviation logistics costs are rising due to a decrease in aircraft operations. In particular, the logistics difficulties of small and medium-sized export companies, which are difficult to meet compared to large corporations, are increasing. The reason for the rise in air freight rates is that aircraft operations have decreased by an average of 70% or more than before the Corona 19 spread. Exports of semiconductors carrying 98.6% of total exports by plane increased 15.8% over the previous year, while demand for cargo of aircraft such as computers (77.3%) and flat panel displays (21.6%) also increased. As the number of countries that urgently seek masks and diagnostic kits increased, exports of aviation increased 79.7% from the previous year. The main reason for the increase in logistics costs of Corona 19 can be the increase in exports of agricultural products due to the recovery of consumption worldwide, lack of ships, bankruptcy of Hanjin Shipping co., LTD., high dependence on overseas shipping companies, and lack of containers as export cargo exceeds the volume of imported cargo.

The high proportion of logistics costs is more important in that it is the last unexplored field for cost reduction of companies, and in that it makes the profitability of the company worse along with the price competitiveness of the product.

In this research, some associations between reasons for reducing corporate logistics costs (RCLC) and corporate classifications such as industry and sales size are examined by exploiting chi-squared test and correspondence analysis. The attributes of the reason of RCLC are as follows: both improvement of delivery frequency & loading rate, outsourcing of logistics, joint logistics operation of transportation & distribution centers, calculation & management of comprehensive & systematic logistics costs and others. The five attributes of 'reasons of reducing corporate logistics costs' presented in this paper are based on 'the cause of decrease in logistics cost in 2018' (inside or outside factors), which is one of the questions of 'the survey table of actual condition of corporate logistics cost in 2018'.

The goal of this work is to establish the government's logistics policy by estimating the logistics costs of the company and understanding the management status, to reduce the logistics costs of the related companies and to provide basic statistical data necessary for the management strategy. In addition, we can accomplish optimal efficiency by thinking over the relationship between each corresponding attribute by referring to statistical significance according to industry and sales size.

Literature review will be dealt with in Section 2, while data collection and statistical techniques will be mentioned in Section 3. All associations stated above based on the statistical findings will be described in Section 4. In Section 5, conclusion remarks and imitations will be mentioned.

2. Literature Review

Jeon and Kim (2015) empirically analyze which factors affect the management performance of domestic logistics companies and suggested implications for improving the management performance of logistics companies. The multiple regression model is used to analyze the effects of factors such as labor cost, logistics cost, exchange rate, international oil price, import and export amount, and sales management cost on business performance such as corporate value (Tobin Q), profitability, stability, and growth potential. As a result of the empirical analysis, the increase in labor costs and management performance shows a significant negative relationship between labor cost growth rate and management performance, and the increase in logistics costs has a positive effect on profitability,

showing a significant positive relationship between logistics cost and management performance. Also, there is no significant result in relation to exchange rate, and there is a negative (-) result between international oil price and business performance. This result can be inferred that the cost of logistics companies is high because of the high proportion of oil costs.

Park (2013) analyzes the relationship between logistics cost and corporate value using samples of 2,237 listed companies for the period from 2006 to 2011. First, the lower the total logistics cost level of sales, the higher the value level of the company. It means that the lower the logistics cost, which accounts for a large portion of the company's sales, the more the company's unique value increases compared to other companies that generate the same sales. Second, the change of total logistics costs in sales seems to be related to the change of corporate value. In other words, if the proportion of total logistics costs in sales decreases, corporate value increases, which means that the change in logistics cost has a direct effect on the change of corporate value. The result is also caused by the change of transportation cost, and the change of storage and packaging cost do not have a significant effect on the corporate value. The effect of logistics cost level and change on the level of corporate value and change is evident in the group of companies with relatively high growth potential and profitability. Therefore, the role of logistics cost to sales in the evaluation of corporate value is inferred that it depends on the attributes and environment of the company.

Ryu and Park (2013) focus on investigating whether such savings are recognized as assets that will continue to bring economic benefits in the future or only affect the net profit of the current period and be interpreted as cost savings when the logistics cost, which accounts for a large portion of the market's investors, is reduced. The low level of transportation costs is very close to the value relevance of accounting information, and the maintenance of low rent is closely related to the value relevance of book value. On the other hand, the information on the reduction of logistics costs compared to the previous year does not seem to be clearly reflected in decision making when investors evaluate the value of the company. However, when the sample companies are classified into sales growth rates, transportation costs are clearly shown, and the results of storage and packaging costs are also affected by sales growth. On the other hand, the reduction of rent is closely related to the value of book value rather than profit value. These results suggest that stable level management and reduction of logistics costs affect the value relevance of accounting information and differentiate according to the sales growth of companies.

Since corporate logistics costs are influenced by sales and cargo size, Chung (2012) analyzes the management status of business logistics costs by industry and sales size. The findings show that the increase in corporate logistics costs is similar to the overall response results, but there is a small difference in the increase in the number of industries and sales size. Additionally, the number of companies responding to the decline is relatively small, but there is a big difference by industry and sales size. Although the reduction plan is focused on the transportation sector, the management and packaging sectors are relatively high, and the reduction plan by industry and sales volume is relatively small.

Because the growth rate of the logistics cost when the sales increase is greater than the reduction rate of the logistics cost in case the sales decreases, Lee, Park and Kim (2011) empirically verify whether the rate of change in logistics cost according to the rate of change in sales shows downward rigidity. In addition, they empirically analyze the effects of corporate characteristics such as inventory turnover period and tangible asset concentration on the downward rigidity of logistics costs. Among the manufacturing companies listed on the Korea Exchange's securities market from 1999 to 2003, companies that can calculate logistics costs based on the simple calculation of logistics costs by the Ministry of Land, Transport and Maritime Affairs are selected as the subjects of analysis. As a result, the ratio of the increase in logistics costs when sales increase is larger than the ratio of the decrease in logistics costs when sales decrease, so the behavior of logistics costs is found to have downward rigidity. These results suggest that if a manager makes decisions related to planning and control using traditional cost estimation method assuming symmetrical cost behavior, there may be errors in decision making. In addition, if the inventory asset rotation period indicating the size of idle resources is long, the downward rigidity of logistics cost behavior is alleviated. These results suggest that companies with large idle resources adjust logistics costs more actively than when sales decrease. And when the concentration of tangible assets measured by the ratio of tangible assets to sales is large, the downward rigidity of logistics cost behavior is strengthened. This result means that for companies with a high proportion of tangible assets with low liquidity, decision-making to adjust logistics costs in a timely manner is delayed when sales decrease.

3. Data Collection and Statistical Techniques

This survey is conducted in 2018 and in the order of business plan and survey execution agency selection, survey design, statistical approval change, survey implementation, interim report, data processing, statistical estimation,

analysis report preparation, data supplementation and final report preparation and publication. It takes about two years from the stage of the survey planning to the analysis and publication of the final survey results.

The Ministry of Trade, Industry and Energy, a statistical writing agency, and the Korea Chamber of Commerce and Industry, a consignment agency, consult academics and industry experts to confirm business plans such as questionnaires and questionnaires. The size of the sample is determined by applying cutting method by dividing each corporate size layer into sample layer and whole layer.

In the case of shippers' survey, the survey is conducted once a year for 2,000 companies based on the business of mining, manufacturing and wholesale and retail industries since 2010. The survey population is 94,976, of which 92,708 are small and medium enterprises and 2,268 are large corporations, and there are 67,490 manufacturing companies and 27,486 wholesale and retail businesses.

The target sample is set by preliminary feasibility study and then the company is extracted according to the double layered system extraction method. That is, the sample is extracted by sorting the subpopulations belonging to the corporate size group by industry in the order of sales.

The logistics managers of the business examine the business situation, the transportation situation, the level and reason of the use of the freight car, the characteristics of the use of the non-business vehicle, the type and pattern of the transportation entrustment of the business vehicle, the transportation management of the business vehicle, the freight management and payment room of the vehicle, the payment fare by the main transportation section of the business vehicle, and the requirements in the freight transportation market.

Corporate logistics costs shall be, in this work, defined as economic value incurred or consumed in order to carry out logistics activities in accordance with the general standards of logistics expenses invoices or as the amount of economic value incurred or consumed to carry out logistics activities of enterprises. They cover transportation, storage, loading and unloading, packaging, logistics information, and logistics management costs.

To test the association between reasons for RCLC and corporate classification statistically, Pearson's chi-square test was conducted and smaller p-value shows the significance of the association between them. On the condition that the significance of association among factors under consideration exists, this relationship may be presented as visual manifestation, in which all rows and columns are marked out for as a point using correspondence analysis (Agresti, 2002). Both level and size of association may be visually inspected by measuring the distance with correspondence analysis among factors considered (Greenacre, 1984; Hoffman & Franke, 1986; Clausen, 1988; Benzercri, 1992; Greenacre, 2007; Hair et al., 2007; Brigitte, 2009; Steven, 2009; Doey & Kurta, 2011; Yang, 2013).

4. Research Results

4.1. Association between Industry and Reasons for Reducing Corporate Logistics Costs (RCLC)

Percentage of corporate logistics costs by industry is in the order of 'nonmetallic mineral' (10.3%), 'food & beverage products' (9.0%), 'electrical equipment' (8.0%), 'wholesale & retail' (8.0%), 'wholesale & commodity brokerage' (8.0%), 'wood, tree & furniture' (7.5%), 'skin, shoes & bag' (7.3%), 'pulp, paper, printing & record media' (7.3%), 'medical, precision, optical devices & clocks' (7.1%), 'manufacturing industry' (6.4%), 'compounds, chemicals, rubbers & plastics' (6.3%), 'metal machining' (5.5%), 'primary metal' (5.3%), 'other machinery & equipment manufacturing' (5.3%), and so on.

On the other hand, it can be seen that 'tobacco manufacturing' (1.1%) accounts for a very small portion of corporate logistics costs compared to other industries (see Figure 1 below).

In case of 'manufacturing industry', the order of the most common share of reasons for RCLC is 'both improvement of delivery frequency & loading rate' (48.5%) and 'outsourcing of logistics' (28.7%), in case of 'skin, shoes & bag', the order of it is 'outsourcing of logistics' (67.0%) and 'joint logistics operation of transportation & distribution centers' (33.0%), and in case of 'wood, tree & furniture', the order of it is 'both improvement of delivery frequency & loading rate' (75.0%) and 'joint logistics operation of transportation & distribution centers' (25.0%).

The most common reasons for RCLC for 'fiber, clothing, accessories& fur' are 'both improvement of delivery frequency & loading rate' (40%), 'outsourcing of logistics' (20%), 'joint logistics operation of transportation & distribution centers' (20%) and 'calculation & management of comprehensive & systematic logistics costs' (20%). For 'metal machining' is 'outsourcing of logistics' (67%), 'outsourcing of logistics' (22%) and 'joint logistics operation of transportation & distribution centers' (11%).

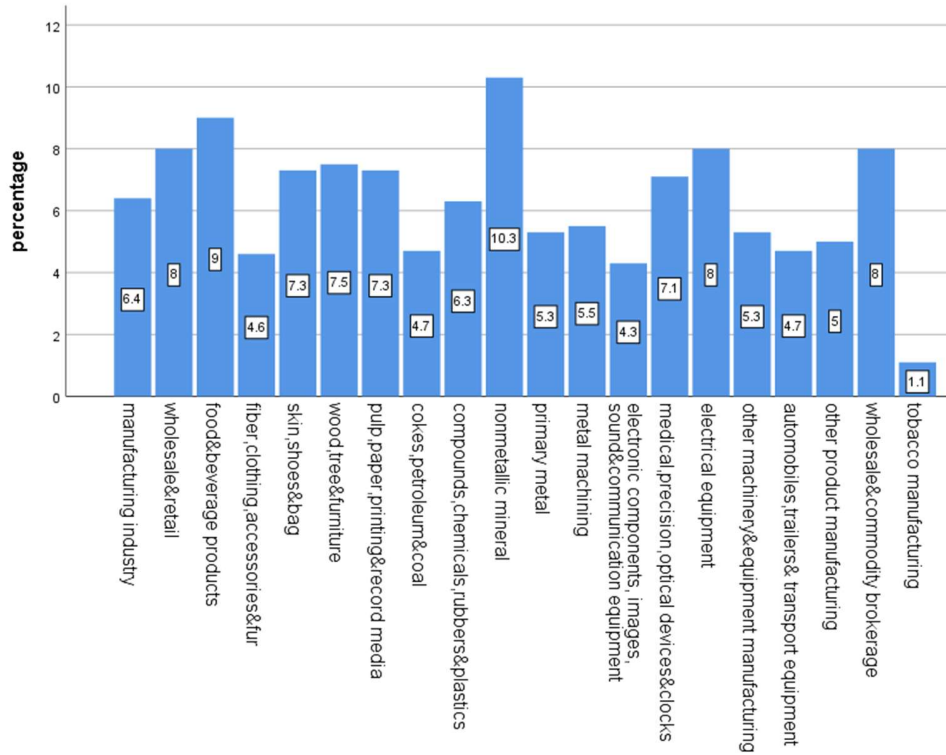


Figure 1: Percentage of Corporate Logistics Costs by Industry

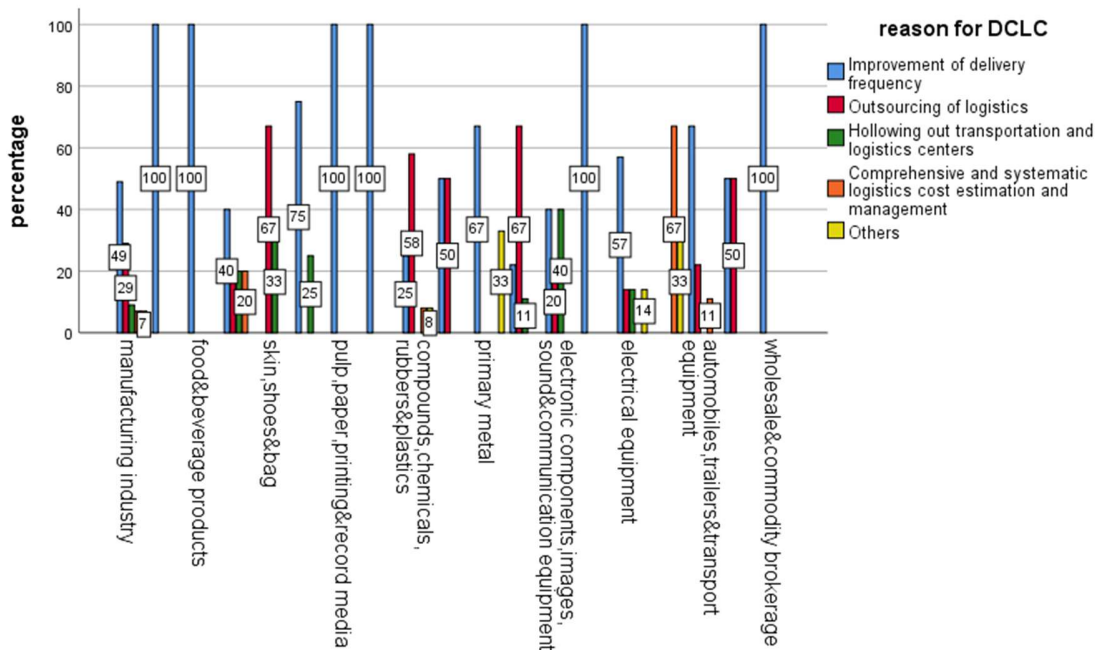


Figure 2: Percentage of Industry by Reasons for RCLC

The following findings are very noteworthy when identifying reasons for RCLC by industry: in the case of ‘wholesale and retail’, ‘food & beverage products’, ‘pulp, paper, printing & record media’, ‘cokes, petroleum & coal’,

‘medical, precision, optical devices & clocks’ and ‘wholesale & commodity brokerage’ among industries, only ‘both improvement of delivery frequency & loading rate’ among reasons for RCLC is the only cause, while in the case of ‘non-metallic minerals’ and ‘other product manufacturing’, ‘both improvement of delivery frequency & loading rate’, and ‘outsourcing of logistics’ are the main causes (see Figure 2).

Among reasons for RCLC, ‘manufacturing industry’ (48.5%), ‘wholesale and retail’ (100.0%), ‘food & beverage products’ (100.0%), ‘wood, tree & furniture’ (75.0%), ‘pulp, paper, printing & record media’ (100.0%), ‘cokes, petroleum & coal’ (100.0%), ‘primary metal’ (67.0%), ‘medical, precision, optical devices & clocks’ (100.0%), ‘electrical equipment’ (57.6%), ‘automobiles, trailers & transport equipment’ (67.0%) and ‘wholesale & commodity brokerage’ (100.0%) are the main causes of ‘both improvement of delivery frequency & loading rate’.

In addition, among reasons for RCLC, ‘outsourcing of logistics’ is the main cause of ‘skin, shoes & bag’ (67.0%), ‘compounds, chemicals, rubbers & plastics’ (58.6%) and ‘metal machining’ (67.0%), while ‘joint logistics operation of transportation & distribution centers’ is chief one of ‘electronic components, images, sound & communication equipment’ (40.0%), ‘skin, shoes & bag’ (33.0%), ‘wood, tree & furniture’ (25.0%), and ‘fiber, clothing, accessories & fur’ (20.0%). In particular, ‘calculation & management of comprehensive & systematic logistics costs’ is the principal reason of ‘other product manufacturing’ (67.0%), as seen in Figure 3.

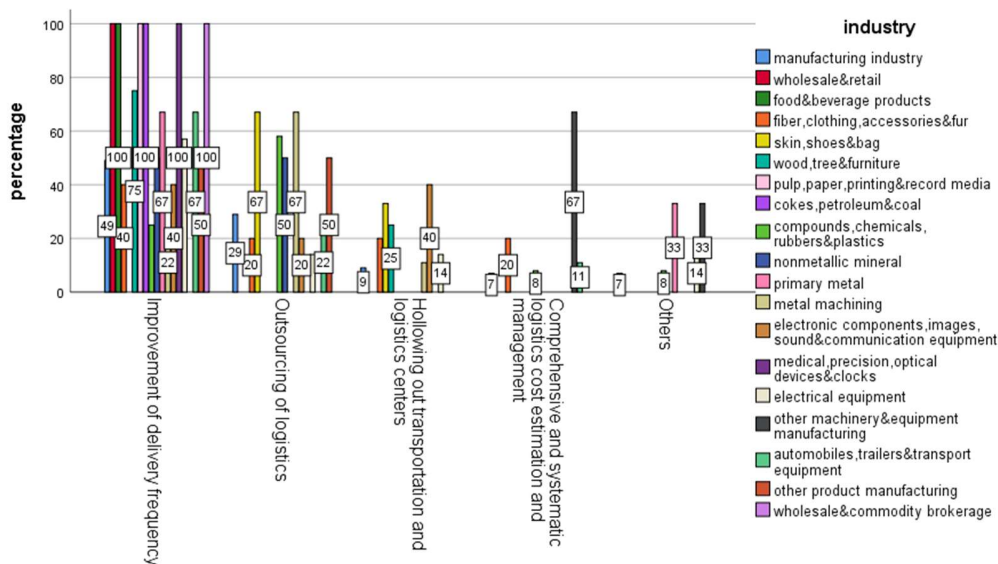


Figure 3: Percentage of Reasons for RCLC by Industry

There exists a clear indication that a significant association between industry and reason for the RCLC exists by performing Pearson’s chi-squared test ($p\text{-value} < .001$). The first, second, third and fourth dimension explain 43.8%, 34.7%, 12.9% and 8.6%, respectively of the total 126.5% of variance accounted for in the model (see Table 1).

Table 1: Summary on Industry

Dimension	Singular Value	Inertia	Chi Square	P-value.	Proportion of Inertia		Confidence Singular Value	
					Accounted	Cumulated	Standard Deviation	Correlation
								2
1	.745	.555			.438	.438	.019	.057
2	.662	.439			.347	.785	.013	
3	.404	.164			.129	.914		
4	.329	.108			.086	1.000		
Total		1.265	2409.8	<.001	1.000	1.000		

We can find the fact that ‘other machinery & equipment manufacturing’ among industries are closely related to ‘calculation & management of comprehensive & systematic logistics costs’ among reasons for RCLC, as shown in Figure 4. In addition, ‘metal machining’ among industries is marginally connected with both ‘outsourcing of logistics’ and ‘joint logistics operation of transportation & distribution centers’, while ‘both improvement of delivery frequency & loading rate’ among reasons for RCLC is jointly and closely connected with both ‘wood, tree & furniture’ and ‘coke, petroleum & coal’ among industries from bi-plot below.

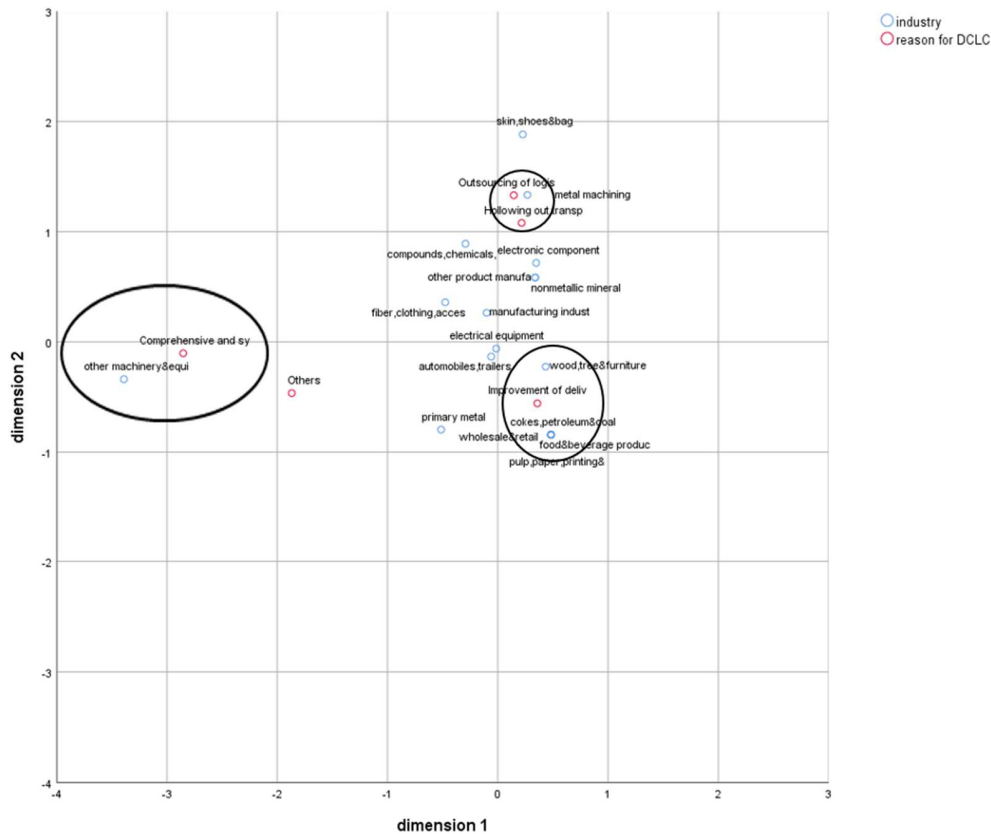


Figure 4: Row and Column Points with Symmetric Normalization

4.2. Association between Sales Size and Reason for RCLC

Percentage of corporate logistics costs by sales size is in the order of ‘less than 50 billion won’ (6.9%), ‘100 billion-300 billion won’ (5.6%), ‘over 300 billion won’ (5.4%) and ‘50 billion won-100 billion won’ (5.1%). It can be shown that the percentage of corporate logistics is not much different from the three sales volumes except ‘less than 50 billion won’ (see Figure 5).

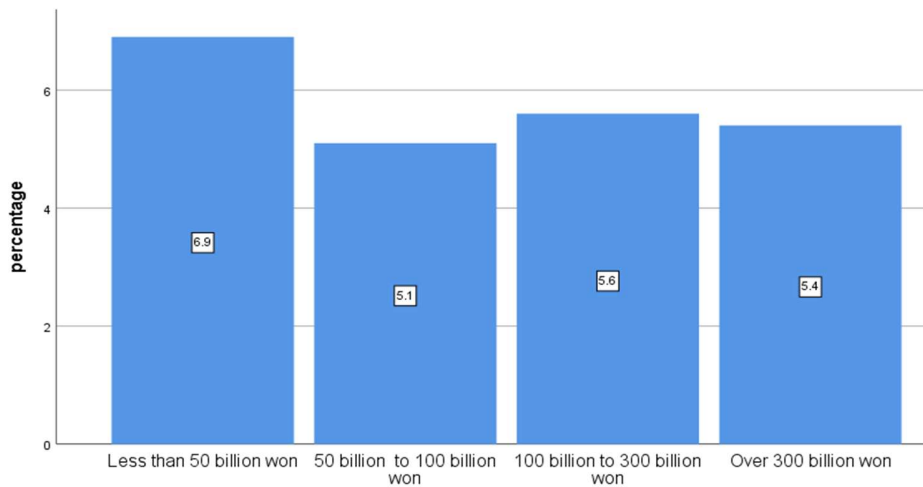


Figure 5: Percentage of Corporate Logistics Costs by Sales Size

The main reason for RCLC is the ‘both improvement of delivery frequency & loading rate’ in each sales size. In particular, ‘improvement of frequency’ is the dominant cause in ‘100 billion-300 billion won’ (80%), as seen in Figure 6.

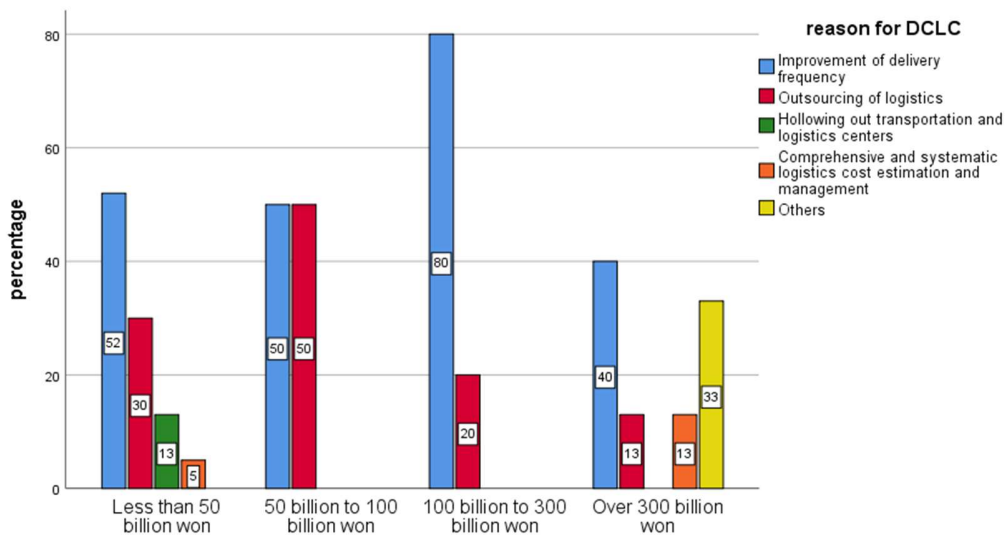


Figure 6: Percentage of Sales Size by Reasons for RCLC

In case of ‘less than 50 billion won’ among sales sizes, the order of the most common reason for RCLC is ‘both improvement of delivery frequency & loading rate’ (52.0%), ‘logistics outsourcing’ (30.0%), ‘joint logistics operation of transportation & distribution centers’ (13.0%), and ‘calculation & management of comprehensive & systematic logistics costs’ (5.0%), while in the case of ‘over 300 billion won’, the order of it is ‘both improvement of delivery frequency & loading rate’ (40.4%), ‘others’ (33.3%), ‘logistics outsourcing’ (13.1%), and ‘calculation & management of comprehensive & systematic logistics costs’ (13.1%). On the other hand, both ‘improving delivery frequency’ and ‘logistics outsourcing’ are the only causes in ‘50 billion-100 billion won’ and ‘100 billion-300 billion won’ among sales sizes.

Among reasons for RCLC, ‘both improvement of delivery frequency & loading rate’ accounts for more than half (55.6%) of the total sales size, followed by ‘outsourcing of logistics’ (28.3%), ‘others’ 8.3%), ‘calculation & management of comprehensive & systematic logistics costs’ (4.5%) and ‘joint logistics operation of transportation & distribution centers’ (3.3%), as outlined in Figure 7.

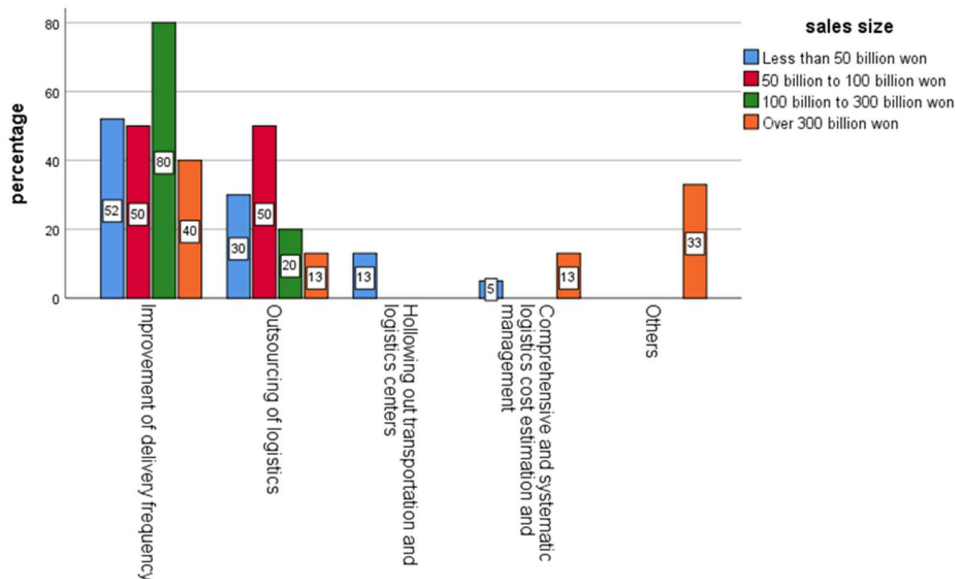


Figure 7: Percentage of Reasons for RCLC by Sales Size

In particular, ‘improvement of logistics frequency’ accounts for the biggest decrease in ‘100 billion-300 billion won’. Similarly, ‘outsourcing of logistics’ and ‘joint logistics operation of transportation & distribution centers’ does the largest decrease in ‘50 billion-100 billion won’, ‘less than 50 billion won’, respectively, while both ‘calculation & management of comprehensive & systematic logistics costs’ and ‘others’ do in ‘over 300 billion won’, as we can see in Figure 7.

It is noteworthy that ‘joint logistics operation of transportation & distribution centers’ and ‘others’ among reasons for RCLC occur only in ‘less than 50 billion won’ and ‘over 300 billion won’, respectively. Additionally, ‘calculation & management of comprehensive & systematic logistics costs’ do both in ‘less than 50 billion won’ and in ‘over 300 billion won’ (see Figure 7).

Table 2: Summary on Sales Size

Dimension	Singular Value	Inertia	Chi Square	P value.	Proportion of Inertia		Confidence Singular Value	
					Accounted	Cumulated	Standard Deviation	Correlation
								2
1	.596	.356			.691	.691	.040	-.074
2	.317	.100			.195	.886	.041	
3	.242	.059			.114	1.000		
Total		.515	205.9	<.001	1.000	1.000		

Pearson’s chi-squared test in Table 2 denotes the close association between sales sizes and reason for RCLC (p-value <.001). In addition, the first, second and third dimension explain 69.1%, 19.5% and 11.4%, respectively of the total 51.5% of variance accounted for in the model as seen in Table 2.

The visual bi-plot inspects that both ‘50 billion-100 billion won’ and ‘100 billion-300 billion won’ are closely related to ‘both improvement of delivery frequency & loading rate’, and ‘less than 50 billion won’ has to do with much ‘outsourcing of logistics’, as shown in Figure 8. In addition, ‘over 300 billion won’ appears to be in a marginal connection with ‘calculation & management of comprehensive & systematic logistics costs’ and ‘others’ among reasons for RCLC.

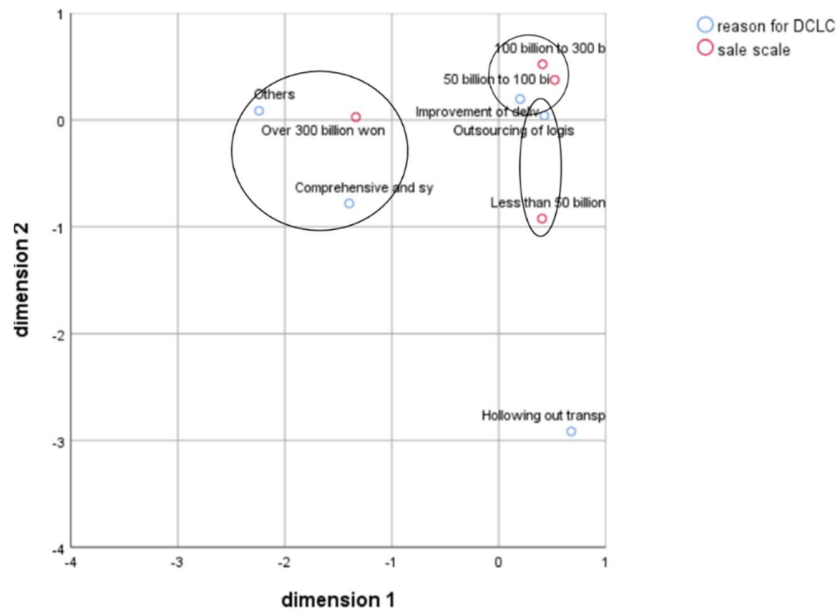


Figure 8: Row and Column Points with Symmetric Normalization

5. Concluding Remarks and Limitations

In this work, we examine some associations between reasons for RCLC and corporate classifications such as industry and sales size by using data summary, chi-squared test and correspondence analysis. At this time, the relationship among factors can be, easily and visually, inspected by bar-chart and correspondence analysis.

The industries that make up the large portion of the ‘both improvement of delivery frequency & loading rate’ among reasons for RCLC are ‘wholesale and retail’ (100%), ‘food & beverage products’ (100%), ‘pulp, paper, printing & record media’ (100%), ‘medical, precision, optical devices & clocks’ (100%), ‘wholesale & commodity brokerage’ (100%), ‘wood, tree & furniture’ (75%), ‘automobiles, trailers & transport equipment’ (67%), ‘primary metal’ (67%), ‘electrical equipment’ (57.6%), ‘nonmetallic mineral’ (50%) and ‘other products manufacturing’ (50%). On the other hand, sales sizes of the ‘both improvement of delivery frequency & loading rate’ account for ‘less than 50 billion’ (52%), ‘50 billion-100 billion won’ (50%), ‘100 billion-300 billion won’ (80%) and ‘over 300 billion won’ (40.4%).

The industries that are a large part of ‘outsourcing of logistics’ among reasons for RCLC are ‘skin, shoes & bag’ (67%), ‘metal machining’ (67%), ‘compounds, chemicals, rubbers & plastics’ (58.6%), ‘nonmetallic mineral’ (50%) and ‘other product manufacturing’ (50%). Sales sizes of the ‘outsourcing of logistics’ account for ‘less than 50 billion’ (30%), ‘50 billion-100 billion won’ (50%), ‘100 billion-300 billion won’ (20%) and ‘over 300 billion won’ (13.1%).

The industries that have become the largest group of ‘joint logistics operation of transportation & distribution centers’ are ‘electronic components, images, sound & communication equipment’ (40%) and ‘skin, shoes & bag’ (33%). Especially, sales sizes of ‘joint logistics operation of transportation & distribution centers’ take ‘less than 50 billion’ (13%) and all the remaining categories (0%).

The industries that take up a rather large proportion of ‘calculation & management of comprehensive & systematic logistics costs’ are ‘other machinery & equipment manufacturing’ (67%) and ‘fiber, clothing, accessories & fur’ (20%), while sales sizes of it hold ‘less than 50 billion’ (5%), ‘over 300 billion won’ (13.1%).

The industries that hold an important position of ‘others’ are ‘other machinery & equipment manufacturing’ (33%) and ‘primary metal’ (33%), while sales sizes of ‘others’ are ‘over 300 billion won’ (33.3%) and all other categories (33%).

In terms of industry and sales size, ‘both improvement of delivery frequency & loading rate’ among reasons for RCLC is jointly related to both ‘wood, tree & furniture’ and ‘cokes, petroleum & coal’, and both ‘50 billion-100 billion won’ and ‘100 billion-300 billion won’. In addition, ‘outsourcing of logistics’ is closely connected to ‘metal machining’ and ‘50 billion-100 billion won’, while ‘calculation & management of comprehensive & systematic logistics costs’ is associated with ‘over 300 billion won’ and ‘other machinery & equipment manufacturing’. Among

reasons for RCLC, 'joint logistics operation of transportation & distribution centers' is linked to 'metal machining' and 'less than 50 billion won', while 'others' is connected with 'over 300 billion won'.

In summary, it can be seen that the two pairs of associations between reasons for RCLC and corporate classifications (such as industry and sales size) exist and the properties and closeness that exist between the categories of each factor can be mined.

This work examined the association between two categorical factors, considering only two corporate classifications such as industry and sales size. Corporate logistics costs are defined as the amount of economic value incurred or consumed to carry out logistics activities of enterprises, and are used for basic analysis reports. Corporate logistics costs can be subdivided into the following six categories: transportation, storage, loading and unloading, packing, logistics information, logistics management. It would be meaningful to investigate the association with the corporate classifications for each of the six subdivided categories mentioned above. We can further examine the association between other corporate classifications such as administrative district, organization type and the cause of RCLC. At this time, organization type includes private business, company corporation, corporation other than companies, unincorporated organization and national & local government.

As the port's logistics congestion continues, freight volume is expected to increase due to increased retaliatory consumption, and freight rates are expected to continue to strengthen as oil costs rise. A proper public-private joint support measure should be introduced to curb excessive freight rates and expand logistics partner cooperation.

As a task to reduce logistics costs of industrial products, the following policy can be proposed: expansion and operation of joint logistics business, new construction of joint logistics center, establishment of cooperative logistics network, support for additional shipping expenses and establishment of ordinance on support for smart distribution logistics. In particular, in order to reduce logistics costs, it is possible to achieve optimal differentiation and efficiency by considering the association between each corresponding attribute by referring to statistical significance according to industry and sales size.

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