A Study on Perceptions on Supply Chain Security Orientation

공급사슬 보안지향성의 인식에 관한 연구

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Abstract

The purpose of this paper is to investigate the perceptions that ports and port users in the supply chain have on the variables of Supply Chain Security Orientation construct. This paper also aims to provide directions and insights to the perceptional issues on supply chain security that have emerged as an independent area of research within SCM and logistics. Starting from the explanation on Supply Chain Security Orientation research model, this paper mainly explored and analyzed the different perceptions of variables in the research model between port group and port user group. Primarily, it explores the descriptive statistics from the questionnaire, and does not analyze the causal relationships of proposed research model. It aims to serve as a guide to the supply chain security managers who are interested in policy issues related to security measures to better performance of the organization.

Key Words : supply chain security orientation, security perceptions, port security

Ⅰ. Introduction

This paper discusses and compares the perceptions of the Supply Chain Security Orientation construct introduced by Autry and Bobbitt (2008)[1] based on the findings from the questionnaire survey. There were 427 respondents in total for this study, and it is divided into two groups: 201 respondents for port group, 226 respondents for port user group. This paper is composed of 5 sections. Section 2 provides explains the research model and its variables for this study. Then section 3 presents the basic profile of ports and port users for this study. Section 4 offers the comparison of descriptive statistics of each variable: Antecedents, Supply Chain Security Orientation, and Port Performance. This section compares and contrasts the responses based on two different groups. Section 5 summarizes and concludes the paper.

Ⅱ. Perception on Supply Chain Security Orientation

Korean ports have become highly security oriented because of mandatory security measures such as ISPS code (KMI 2005)[2]. In addition, security program (AEO and ISO28000) certified Korean companies in the supply chain can be judged that they are security devoted and motivated companies in order to facilitate trade and keep the security level high at the same time (KMI 2008)[3]. Firms and organizations are willing to invest financial resources to adopt security measures to have competitive edge by being security program certified. Mandatory security regulations such as ISPS code are implemented in ports and their maritime supply chains, while supply chain security programs are implemented based on voluntary participation in Korea (KITA 2009)[4]. Maritime supply chain and port security involves various aspects of secure movement of products based on participation of multiple organizations in the supply chain (Talley 2008)[5].

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1) Autry, C. W., and M. Bobbitt. L. "Supply chain security orientation: conceptual development and a proposed framework." *International Journal of Logistics Management* Vol. 19. No. 1 2008. pp.42-64.
2) 한국해양수산개발원. 「ISPS Code 시행에 따른 항만보안관리체제의 제도적 개선방안 연구」, 해양수산부, 2007, pp. 123-134.
3) 한국해양수산개발원, 「국가항만보안계획 수립 등을 위한 연구」, 국토해양부, 2008, pp. 25-57.
4) 한국무역협회, 「수출입업체 물류보안 가이드」, 2008, pp. 63-70.

Thus, port security can be analyzed from the perspective of supply chain management because security regulations involve various organizations in the supply chain not just a port as a single entity (Bichou 2004)[6]. Ports are the capital of trading activities and security of ports has to include affiliated organizations and activities with the members in the supply chain. However, it was found that the perception of ports and port users are quite different in security issues around ports, and the difference should be analyzed and compared to capture the different perceptions to realize the difference (KMI 2008)[7]. Thus, this study is designed to identify and analyze the different perceptions of ports and port users in the variables of Supply Chain Security Orientation research model proposed by Autry and Bobbitt (2008)[8].

There have been several attempts to analyze the perceptions of security regulations in previous studies. Choi and Choi (2010)[9] analyzed the level of perception the exporting companies in Korea have on supply chain security and found that it was very low in all categories. They perceived its importance to a certain degree, but the level of understanding in the security issues was found considerably low. Lee et al. (2010)[10] also analyzed the perceptions of exporting companies in Korea and found similar results. Firms perceived the importance of supply chain security, but knew little about the security measures and regulations. It was also pointed out that exporting companies showed very little understanding about the compulsory maritime security measures such as ISPS code. KMI (2008)[11] analyzed the perceptions of port security in two groups: port group and port user group, and found there were significant differences. They both perceived the importance of port security, education, and investment of security related infrastructure, but there were differences in financial investment issues. However, previous studies were all based on limited number of samples and industries which are hard to generalize. Also, considering the dearth of the related studies in the field, it is timely and necessary to analyze the perception of supply chain security from maritime context because ports are being security oriented because of the mandatory security regulations. This justifies the adoption of Supply Chain

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5) Talley, W. K. (Ed.). Maritime safety: security and piracy. Informa, 2008, pp. 208-210.
6) Bichou, K. "The ISPS code and the cost of port compliance: an initial logistics and supply chain framework for port security assessment and management", *Maritime Economics & Logistics*, 6. 4. 2004, pp. 322-348.
7) 전게서
8) 전게서
9) 최혁준, 최문성, 한국수출업체의 물류보안 인식에 관한 실태분석, 「통상정보연구」, 제 12권, 제 1호, 2010. pp. 375-400.
10) 이주원, 최혁준, 최문성, 「한국수출업체의 물류보안 인식 및 리스크 관리방안」, 정석물류통상연구원, 2010. pp. 106-130.
11) 전게서

Security Orientation research framework introduced by Autry and Bobbitt (2008)[12] to ports and their maritime supply chains. This study expands the concept of port security to a supply chain level by adopting the proposed variables in Supply Chain Security Orientation construct and analyze it in two groups: port group and port user group. It aims to explore the different perceptions, and provide implications to port authorities in Korea to set priorities of security related policies for ports and affiliated companies in the maritime supply chain.

This paper adopted the initial framework from previous studies, and modified through semi-structured interviews by adding and omitting variables to reflect the realities of Korean ports and supply chains to the model. Since it was mentioned that the model is based on limited number of people using qualitative methods, experts in various area including port security, terminal security, the United Nations, and academics are involved in the interview process. Since this study is mainly focusing on the analysis of the perceptions in two groups, it briefly introduces the result of the interview and show how the final research model is built.

The model was initially proposed for the examination of causal relationships. However, since this is the first study to adopt the framework and test it in ports and maritime supply chain context, it is necessary to identify and analyze the different perceptions of the port group and port user group in order to find out the differences. This study applies the framework identified from previous studies to Korean ports and maritime supply chains, analyzes the basic descriptive statistics of the sample, and aims to provide any statistical differences in two groups. The model is initially proposed for examination of causal relationships, but the purpose of this paper is to identify the differences of perceptions by analyzing the responses from the questionnaire survey.

1. Variables in the Antecedents construct

Risk Perception (RP) is widely considered for organizations to become security oriented to minimize the level of overall risk in the supply chain (Zsidisin 2003)[13]. It was widely mentioned in previous studies that level of risk perception drives the organizations to be security oriented by adopting various security programs. Yang (2011)[14] argued that several risk factors motivate firms

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12) 전게서

13) Zsidisin, G. A. (2003) A grounded definition of supply risk. *Journal of Purchasing & Supply Management* 9. pp. 217‑224

14) Yang, Y. C. (2011) Risk management of Taiwan'smaritimesupplychainsecurity. *Safety Science*, 49. 3, pp. 382-393.

in maritime industries to adopt supply chain security initiatives. Also, Security Vulnerabilities (SV) can be found from fear of loss, damage, and contamination of goods in the supply chain. It is the primary part of the security oriented organizations in terms of increasing crime and terrorism (Autry and Bobbitt 2008)[15]. However, based on the findings of the semi-structured interviews conducted with 20 experts in port security, United Nations, and academics, these two variables are merged into one variable: Risk Perception and Security Vulnerability (RPSV). Also, Partner Directives (PD) variable originally proposed by previous studies is dropped based on the interview findings. Instead, the variables Financial Resources (FR) and Supply Chain Security Initiatives (SCSI) were strongly proposed as the primary factors for ports and maritime supply chains to be come security oriented. Thus, three variables: RPSV, FR, and SCSI are chosen as the primary factors for the Antecedent construct.

2. Variables in the Supply Chain Security Orientation construct

Security Preparation and Planning (SPP) and Security related Partnership (SRP) are proposed as the first two major variables for the construct. In order to cope with the disruptions and risks in the supply chain, organizations must prepare a security plan to avoid any kind of disruptions and risks (Zsidisin 2005)[16]. Moreover, partnership is essential to implement various security related regulations in the supply chain such as AEO and C-TPAT (Sheu 2006)[17]. It is widely mentioned as a critical factor for external supply chain security collaboration. Autry and Bobbit (2008)[18] also introduced Organizational Adaptation (OA) and Security Dedicated Communications and Technology (SDCT). OA refers to the physical improvements such as buildings, facilities, and information network related to organizational security. SDCT refers to several measures related to supply chain security such as RFID and EDI (KMI 2009)[19]. Furthermore, Security Culture (SC) and Security Education (SE) were identified as the additional component of Supply Chain Security Orientation construct from the interview findings.

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15) 전게서

16) Zsidisin, G.A., Melnyk, S.A .and Ragatz, G. L. (2005), "An institutional theory of business continuity planning for purchasing and supply chain management", International Journal of Production Research, Vol. 43 No. 16, pp. 3401-20.

17) Sheu, Chwen, HsiuJu Rebecca Yen, and Bongsug Chae. (2006) Determinants of supplier-retailer collaboration: evidence from an international study. *International Journal of Operations & Production Management* 26.1 pp. 24-49.
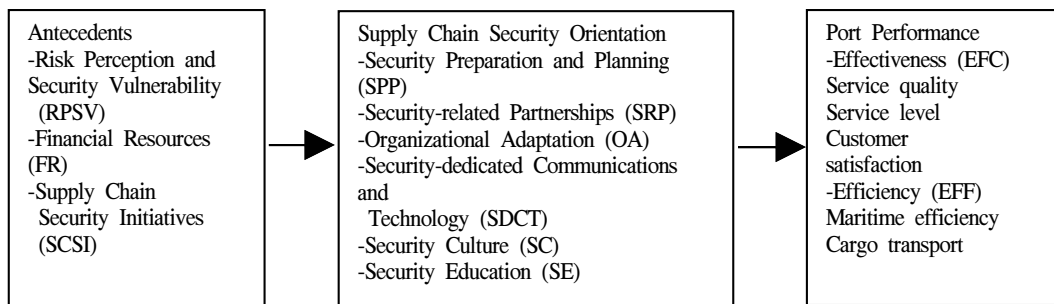
18) 전게서

19) 김수엽, 최종희, 김찬호, 「항만물류보안산업의 발전방안 연구」, 한국해양수산개발원, 2009.

3. Variables in the Port Performance construct

The interview findings indicate that in terms of security, port performance should be analyzed from two aspects: 'External Effectiveness' and 'Internal Efficiency'. This categorization is widely utilized measurement scales in port research, and it is necessary to identify the effectiveness and efficiency of ports when security related conceptual model is involved. Especially, it was identified from the interviews that the impact of security measures should be analyzed from these two variables because previous studies have not identified the difference.

After the in-depth interview process and literature review, the complete research model was developed in the Figure 1. As can be seen from the Figure, modifications have been made after the interviews. First, the components of Antecedents have been changed. The Risk Perception and Security Vulnerability variables are merged in to Risk Perception and Security Vulnerability (RPSV). Also, Partner Directive (PD) variable was dropped, and replaced by Financial Resources (FR) and Supply Chain Security Initiatives (SCSI). Also, in the supply chain security orientation construct, two variables are added which are: Security Culture (SC) and Security Education (SE). Thirdly, the components of Port Performance (PP) were identified which are: Effectiveness (EFC) and Efficiency (EFF). Finally, the potential SCSO moderator construct was dropped from the framework because it was found unnecessary in the causal relationship in the research model from the interviews. Thus, the model became much simpler with added/dropped variables. These modifications on the initial research framework proposed by Autry and Bobbitt (2008) reflects the perceptions and ideas of the people who actually work in the field of ports and supply chain security in Korea. Since the complete research model is built, next section discusses the overview of port A and B and their supply chains.

| Antecedents
 -Risk Perception and Security Vulnerability (RPSV)
 -Financial Resources (FR)
 -Supply Chain Security Initiatives (SCSI) | → | Supply Chain Security Orientation
 -Security Preparation and Planning (SPP)
 -Security-related Partnerships (SRP)
 -Organizational Adaptation (OA)
 -Security-dedicated Communications and Technology (SDCT)
 -Security Culture (SC)
 -Security Education (SE) | → | Port Performance
 -Effectiveness (EFC)
 Service quality
 Service level
 Customer satisfaction
 -Efficiency (EFF)
 Maritime efficiency
 Cargo transport |

〈Figure 1〉 Supply Chain Security Orientation Research Model
Source: Author, Autry and Bobbit (2008)[20]

Ⅲ. Basic information about ports and port users

In total, 743 questionnaires were distributed, and 730 were reported that they were delivered safely. 13 were returned because of the wrong address. Among those, 429 of them were returned, and the whole response rate was 57.4%. The researcher visited and met many people (around 120) in Korea for the questionnaire survey in order to get the best response for the research rather than relying entirely on mail or on-line questionnaire using internet. Among the collected questionnaires, 2 responses were discarded because one had no answers at all, and the other one had the same answer 1 on all questions in the Likert scale. Therefore, remaining 427 questionnaires were used in this study.

<Table 1> Questionnaire Response Rate Summary

Category	Survey distributed	Non deliverable	Safely delivered	Total responses	discarded	Effective survey	Response rate
Total	743	13	730	429	2	427	57.4%

Source : Author

Table 2 shows the overview of the companies port security A and B. There are subsidiary companies for both ports focusing only on security related tasks such as implementing ISPS code, CSI, cargo safety, and passenger control. They are the perfect match for the current study, and the researcher collected 51 from port A's subsidiary security company, and 48 from port B's. Also, the port user group for port A and B (trade, land transport, manufacturing, warehouse management, forwarding, and maritime transport) had 226 respondents (53%). They are supply chain security programs (AEO and ISO28000) certified firms.

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20) 전게서

<Table 2> Profile of Respondents in Port Management Group

Ports	Category	Number of respondents	Number of Personnel	Main Role
Port A	Port A	51	140	Container trading focused
	Port A's security related subsidiary company	51	301	ISPS code and CSI focused/terror control/cargo and passenger safety
	Total	102	441	
Port B	Port B	51	177	Bulk focused trading
	Port B's security related subsidiary company	48	200	ISPS code/cargo safety/passenger and terror control
	Total	99	377	

Source: Author

Table 3 shows the comparison of ports A and B. Port A, the biggest port in Korea, is container focused hub port, and port B, the second biggest port, is bulk focused feeder port.

<Table 3> Summary of Comparison of Port A and B in 2010

Category	Port A	Port B
Implementing security program	ISPS code, CSI	ISPS code
Percentage of cargo handling -total seaborne cargo -containerized cargo	27.1% 73.2%	15.5% 9.8%
Container throughput(1000 TEU)	14,194	1,903
Main role	Container focused hub port	Bulk focused feeder port

Source: UNCTAD (2012)[21]

The companies (trade, land transport, manufacturing, forwarding warehouse management, and maritime transport) using Port A and B are security program certified firms (AEO and ISO2800). This means that they are aware of the rules and regulations of security issues in the supply chain. The number of companies is almost evenly divided in port A and B in all job categories

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21) UNCTAD (2007) *Maritime security: ISPS code implementation, costs, and related financing.* Report by the UNCTAD secretariat.

to avoid statistical bias. The reason why the researcher chose to select the companies that were all security program certified (AEO and ISO28000) was based on the previous studies that security certified firms are security oriented companies that are sensitive on security issues in the supply chain. This study aims to identify how the port user group view and perceive the whole process of security orientation of ports in comparison to port group. Because the security program of port user group and port authorities have different benefits and characteristics, it is vital to see how these changes in regulations affect the perception and performance. The tradeoffs of the benefits of these programs are analyzed in terms of effectiveness and efficiency.

〈Table 4〉 Analysis of the Security Program-certified Companies in Port users

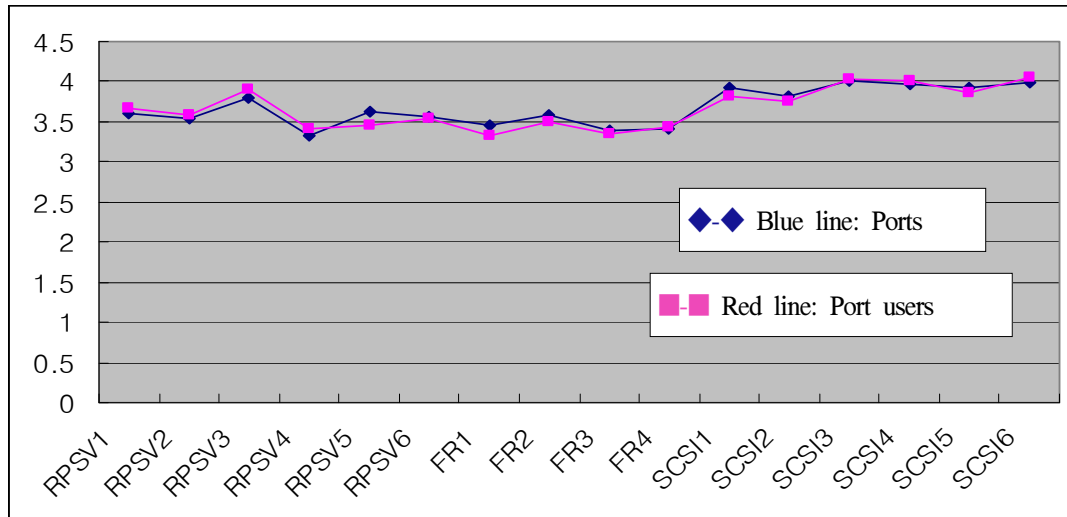| Category	Frequency	Port A	Port B	Voluntary security program
Trade(export and import)	26	13	13	AEO, ISO28000 certified
Land Transport	37	20	17	AEO certified only
Manufacturing	22	10	12	AEO certified only
Warehouse Management	23	11	12	AEO, ISO28000 certified
Forwarding	44	20	24	AEO certified only
Maritime Transport	74	43	31	AEO, ISO28000 certified
Port user group total	226	117	109	AEO, ISO28000 certified

Source: Author

Ⅳ. Analysis of the perceptions

1. Perceptions in Antecedents construct

Figure 2 illustrates the mean values of two groups: ports and port users. There were 8 items for both groups that had higher values than the other. In financial resources, ports had higher mean values than port users in FR1, FR2, and FR3. This may imply that ports are more sensitive in financial resources as an antecedent factor for Supply Chain Security Orientation. In RPSV

(Risk Perception and Security Vulnerabilities), port users had higher values in RPSV1, RPSV2, RPSV3, and RPSV4. This may imply that port users are more sensitive in risk perception and security vulnerabilities than ports.

〈Figure 2〉 Comparison between Ports and Port users in the Antecedent constructs
Source: Author (X axis: each questions in the Antecedents, Y axis: 5 point Likert scale)
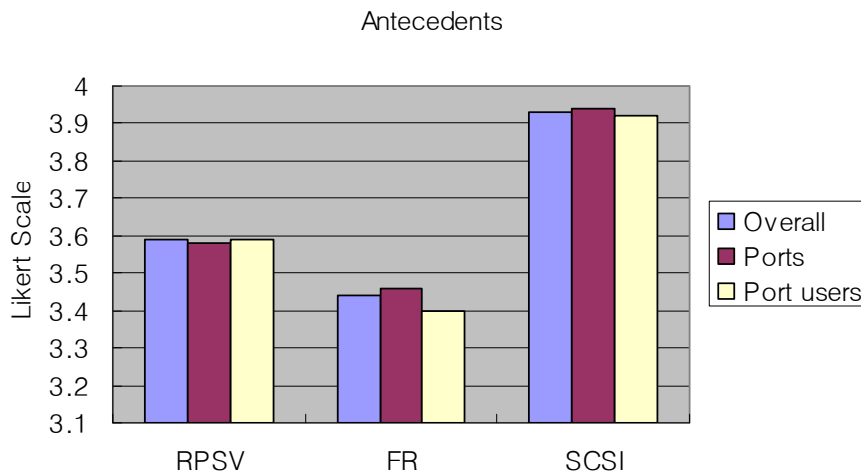
〈Table 5〉 Mean values of variables in Antecedents construct

Mean value	RPSV	FR	SCSI
Overall	3.59	3.44	3.93
Ports	3.58	3.46	3.94
Port users	3.59	3.4	3.92

Source: Author(based on 5-point Likert scale)

It was shown from the above analysis that both groups agreed to a moderate level to RPSV variable. Nevertheless, there were extreme responses in two variables: FR and SCSI. FR showed very low agreement and SCSI showed the highest level of agreement of all variables to the measurement scales. This means port group and port user group both perceive they do not have sufficient level of financial resources for security measures. On the other hand, both groups highly agreed to the fact that Supply Chain Security Initiatives such as ISPS code, CSI, AEO, and ISO28000 are important for their organizational competitiveness and performances. Especially, port

user group showed that ports they use have little intensions for investing security measures which indicates that ports and port users are reluctant to invest their financial resources for security enhancement. Figure 3 presents the mean values of variables in Antecedents construct.

<Figure 3> Mean values of variables in Antecedents construct
Source: Author(based on 5-point Likert scale)

Moreover, Table 6 presents the ANOVA result. It shows the mean values of F-statistics which is 8.997^{***}, and its p-value is 0.000 (<0.05). Although the Figure 2 illustrates very similar response pattern in both groups, this means the differences between two groups are statistically significant which needs more detailed analysis. Specifically, the variable RPSV2 and RPSV5 showed significant differences (p-value: 0.047, 0.024), and SCSI5 showed marginal significance (p-value: 0.062). Although other individual variables showed no statistical significance, ANOVA analysis of the mean values as a whole in both groups showed statistically significant results, which requires the need for multi-group analysis for future research in the Antecedent construct.

<Table 6> ANOVA results for the Antecedents

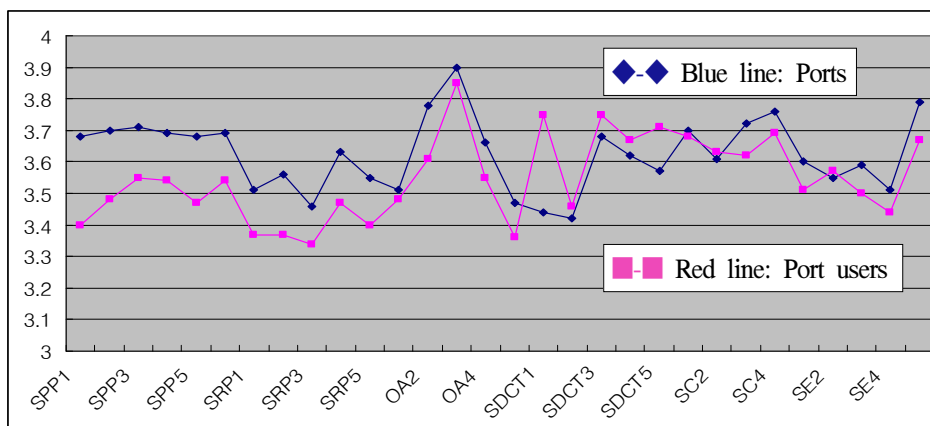| Category	Port and port users		Category	Port and port users	
Items	F-statistics	p-value<0.05	Items	F-statistics	p-value<0.05
Mean values: 8.997*** , P-value: .000					
RPSV1	1.510	.199	SCSI1	.811	.519

Category	Port and port users		Category	Port and port users	
RPSV2	2.430*	.047	SCSI2	1.075	.369
RPSV3	.424	.791	SCSI3	.244	.913
RPSV4	.330	.858	SCSI4	.343	.849
RPSV5	2.839*	.024	SCSI5	2.264	.062
RPSV6	.953	.433	SCSI6	1.558	.185
FR1	.159	.959			
FR2	1.792	.130			
FR3	.179	.949			
FR4	1.402	.233			

Source: Author(***: p-value<0.001, **: p-value<0.01, *: p-value<0.05)

2. Perceptions in Supply Chain Security Orientation construct

In the SCSO construct, the highest was SCSI3 (3.88), which was "Our terminal, or port we use believe Supply Chain Security Initiatives will be much more important", and the lowest was SRP3 (3.39), which was "Our terminal, or port we use maintain relationships with supply chain members based on trust rather than contractual obligations". In average, 56.1% of the respondents agreed to the variable SPP, 49.7% agreed to SRP, 57.58% agreed to OA, 56.32% agreed to SDCT, 59.45 agreed to SC, and 54.74% agreed to SE. Comparison between ports and port users in SCSO is illustrated in Figure 4.
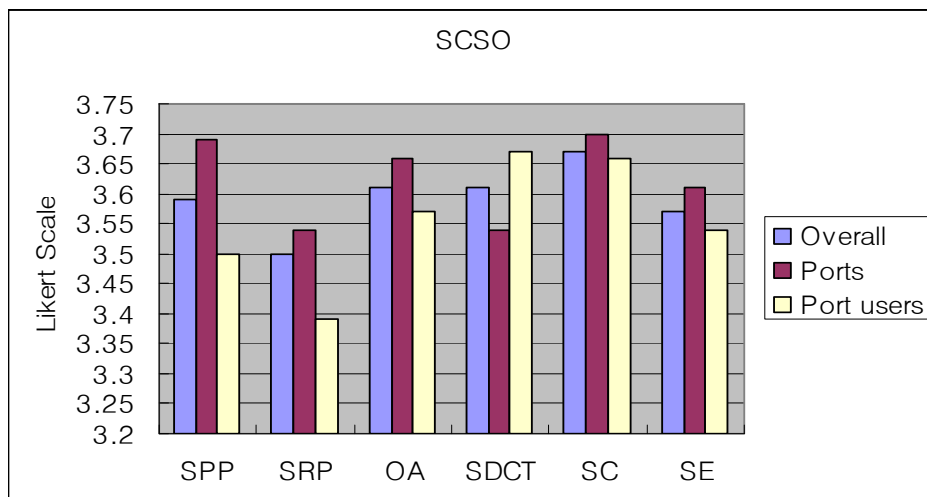

〈Figure 4〉 Comparison between Ports and Port users in the SCSO
Source: Author (X axis: each questions in the Antecedents, Y axis: 5 point Likert scale)

〈Table 7〉 Mean values of variables in Supply Chain Security Orientation construct

Mean value	SPP	SRP	OA	SDCT	SC	SE
Overall	3.59	3.5	3.61	3.61	3.67	3.57
Ports	3.69	3.54	3.66	3.54	3.7	3.61
Port users	3.5	3.39	3.57	3.67	3.66	3.54

Source: Author(based on 5-point Likert scale)

Other than all the SDCT items, SC2, and SE2, all the mean values for the port group were higher than those of port users. This may imply that ports are more sensitive in all the variables except SDCT than port users. Port users showed higher mean values than port group only in SDCT. This means that port users are more sensitive in security related communication and technology than ports among all the variables in the SCSO. Other than the variable SDCT, port users showed lower agreement in most of the measurement items than those of ports. Especially, variables SPP and SRP graphically showed a big gap between two groups. Variable SC and SE showed little difference.

〈Figure 5〉 Mean Values of the Variables in Supply Chain Security Orientation Construct
Source: Author

In terms of the mean values, it is clearly shown from the above Figure that ports perceived more important in all the variables except SDCT. It is the only variable that port user group

perceived more important than port group. It was also shown that port group perceived security related planning, partnership, organizational adaptation, culture, and education are more important for the organization than port user group. This might be because of the compulsory security measures such as ISPS code affects the perception of people in the organization more compared to those companies that are implementing security measures based on voluntary participation such as AEO and ISO28000.

Since it is obviously shown that there were big differences in mean values in many variables, one way ANOVA (Analysis of Variance) was conducted.

The Table 8 below presents the mean values of F-statistics which is 6.772[***], and its p-value is 0.000 (<0.05). This means the differences between two groups are statistically very significant which needs more detailed analysis. Specifically, variables SPP1 (0.003), SDCT1 (0.000), SDCT4 (0.002), SE1 (0.032), SE2(0.011) showed statistical significance, and SRP4 (0.059) showed marginal difference in two groups. Although other variables showed no statistical significance, ANOVA analysis of the SCSO showed very high significant results. This also justifies the need for another in-depth multi-group analysis in the SCSO construct.
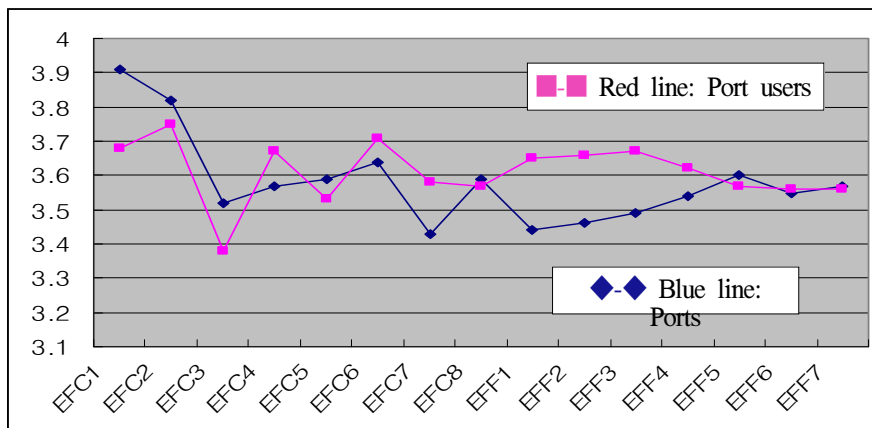
<Table 8> ANOVA results for SCSO

Category	Groups		Category	Groups		Category	Groups	
Items	F	p-value<0.05	Items	F	p-value<0.05	Items	F	p-value<0.05
Mean values: 6.772***, P-value: .000								
SPP1	4.068**	.003	OA1	1.206	.308	SC1	2.067	.085
SPP2	.380	.823	OA2	.791	.500	SC2	1.096	.359
SPP3	.326	.861	OA3	1.716	.146	SC3	.825	.510
SPP4	.914	.456	OA4	.974	.422	SC4	1.679	.155
SPP5	2.100	.081	OA5	.876	.478	SE1	2.668*	.032
SPP6	1.276	.279	SDCT1	7.167***	.000	SE2	3.752*	.011
SRP1	1.462	.214	SDCT2	1.434	.212	SE3	.404	.806
SRP2	1.585	.178	SDCT3	.833	.505	SE4	.569	.686
SRP3	.643	.632	SDCT4	4.253**	.002	SE5	1.526	.194
SRP4	2.295	.059	SDCT5	1.825	.124			
SRP5	1.053	.380						

Source: Author(***: p-value<0.001, **: p-value<0.01, *: p-value<0.05)

3. Perceptions in Port Performance construct

The highest was EFC1 (3.80), which was "Our terminal, or port we use provides a consistent reliable service", and the lowest was EFC3 (3.44), which was "Our terminal or port we use handles cargoes on customers' time requirements.". In average, 57.13% of the respondents agreed to EFC and 54.11% agreed to EFF variable. In the EFC variable, ports had higher values in all the items except EFC4, EFC6, and EFC7. However, the port users showed higher mean values in all the items except EFF5 and EFF7. This may imply that ports are more positive in effectiveness, while port users are more positive in efficiency aspects of performance of ports. Comparison between ports and port users in PP is illustrated in Figure 6. Ports and port users showed very different response pattern. Especially, in the EFF variable, port user group showed a stronger agreement than the port group.

〈Figure 6〉 Comparison of Ports and Port users in the PP
Source: Author (X axis: each questions in the Antecedents, Y axis: 5 point Likert scale)

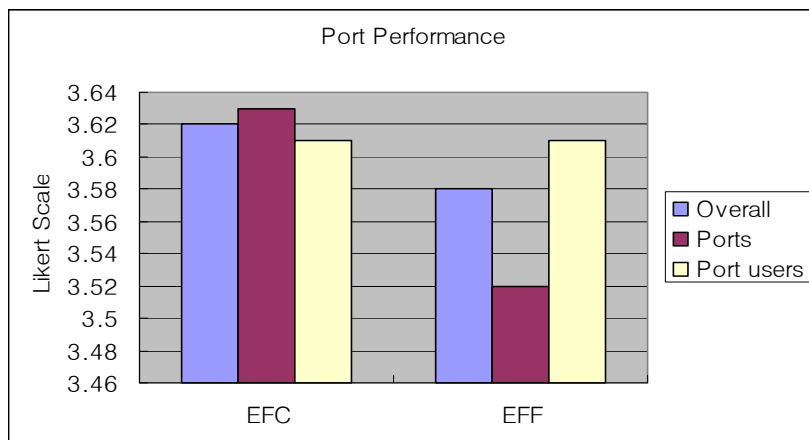〈Table 9〉 Mean values of variables in Port Performance construct

Mean value	EFC	EFF
Overall	3.62	3.58
Ports	3.63	3.52
Port users	3.61	3.61

Source: Author(based on 5-point Likert scale)

In terms of the average of all items of each variable, port group showed that they perceived positively in Effectiveness, while Efficiency was a bit lower. Port user group showed almost the same level of perceptions in both Effectiveness and Efficiency. This may be because ports perceive more hindered by the compulsory security measures while port users are implementing security programs that are providing some benefits to facilitate trade. Also, compared to the level of effectiveness that ports perceive, port users showed lower responses to the measurement scales. This gap should be bridged by providing better services to port users and strengthening the efficient cargo transportation in port operation.

The comparison of mean values in Port Performance construct is shown below in Figure 7. It is interesting that ports perceive much positively in effectiveness of ports than port user groups. On the other hand, ports perceive a little lower in efficiency of ports than port user groups. Since it is obviously shown that there were clear differences of the mean values in two variables of the PP, one way ANOVA (Analysis of Variance) was conducted.

〈Figure 7〉 Mean values of variables in Port Performance construct
Source: Author(X axis: each questions in the Antecedents, Y axis: 5 point Likert scale)

〈Table 10〉 ANOVA results for Port Performance

Category	Groups		Category	Groups	
Mean values: 10.384***, P-value: .000					
Items	F	p-value	Items	F	p-value
EFC1	2.220	.052	EFF1	1.061	.376

Category	Groups		Category	Groups	
EFC2	.087	.986	EFF2	2.480*	.032
EFC3	4.554**	.001	EFF3	2.485*	.043
EFC4	2.064	.085	EFF4	1.311	.265
EFC5	.976	.420	EFF5	2.039	.088
EFC6	1.297	.271	EFF6	1.835	.121
EFC7	2.045	.088	EFF7	.634	.639
EFC8	.829	.507			

Source: Author(***: p-value<0.001, **: p-value<0.01, *: p-value<0.05)

Table 10 shows the ANOVA result. It shows that the mean values of F-statistics which is 10.384***, and its p-value is 0.000 (<0.05). This means the differences between two groups in the PP are statistically very significant which needs more detailed analysis. Specifically, variables EFC3 (0.001), EFF2 (0.032), EFF (0.043) showed significant differences, and EFC (0.052), EFC7 (0.088) showed marginal significant differences. Although other variables showed no statistical significance individually, the ANOVA analysis of the mean value of the PP showed very significant results. This also justifies the in-depth investigation of multi-group analysis for future research in the Port Performance construct.

V. Conclusion

This study analyzed the different perceptions of variables proposed in the research model Supply Chain Security Orientation by Autry and Bobbitt (2008)[22]. It is based on big sample size based on questionnaire survey (201 respondents: port group, 226 respondents: port user group). The result showed that ports and port users both agreed to the high level of importance in supply chain security initiatives. Nevertheless, they presented low level of agreement on the financial investment issues in the Antecedent construct. Ports showed higher perception of importance in most of the variables in the Supply Chain Security Orientation construct except SDCT compared to port user group. This means port users perceive security related technology is more important

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22) 전게서

for the organization than ports. In terms of performance measurement, ports showed higher measurement in Effectiveness, while port users presented higher agreement on Efficiency variables. In addition, there were statistical differences in mean values of all three constructs which need further studies using multi-group analysis. Interestingly, ports showed higher agreement on most of the variables related to Supply Chain Security Orientation construct. This might be because of the fact that ports are following mandatory regulations while port users are implementing voluntary security programs. Also, in terms of performance measurement, it was shown that port group showed more positive agreement on Effectiveness variable to upgrade the level of security-related service quality while port users showed more positive agreement on Efficiency variable which is facilitated by implementing voluntary security programs such as AEO and ISO28000. Despite its contribution, this study has limitation in analyzing the perceptions of variables in ports and their maritime supply chain industry only. More in-depth analysis should be carried out in different context, industry, and countries to generalize the results identified in this paper.

Reference

김수엽, 최종희, 김찬호, 「항만물류보안산업의 발전방안 연구」, 한국해양수산개발원, 2009.

이주원, 최혁준, 최문성, 「한국수출업체의 물류보안 인식 및 리스크 관리방안」, 정석물류통상연구원, 2010. pp. 106-130.

한국해양수산개발원, 「ISPS Code 시행에 따른 항만보안관리체제의 제도적 개선방안 연구」, 해양수산부, 2007, pp. 123-134.

한국해양수산개발원, 「국가항만보안계획 수립 등을 위한 연구」, 국토해양부, 2008, pp. 25-57.

한국무역협회, 「수출입업체 물류보안 가이드」, 2008, pp. 63-70.

최혁준, 최문성, "한국수출업체의 물류보안 인식에 관한 실태분석", 「통상정보연구」, 제 12권 제 1호, 2010. pp. 375-400.

Autry, C. W., and M. Bobbitt. L., "Supply chain security orientation: conceptual development and a proposed framework", *International Journal of Logistics Management*, Vol. 19, No. 1,2008, pp.42-64.

Bichou, K., "The ISPS code and the cost of port compliance: an initial logistics and supply chain

framework for port security assessment and management", *Maritime Economics & Logistics*, Vol. 6, No. 4, 2004, pp. 322-348.

Sheu, C., HsiuJu R. Y., and Chae. B., "Determinants of supplier-retailer collaboration: evidence from an international study" *International Journal of Operations & Production Management*, Vol. 26, No. 1, 2006, pp. 24-49.

Talley, W. K. (Ed.). Maritime safety: security and piracy. Informa, 2008. pp. 208-210.

UNCTAD Maritime security: ISPS code implementation, costs, and related financing. Report by the UNCTAD, 2007.

Yang, Y. C. "Risk management of Taiwan's maritime supply chain security". *Safety Science*, Vol. 49. No. 3, 2011, pp. 382-393.

Zsidisin, G. A. "A grounded definition of supply risk", *Journal of Purchasing & Supply Management*, Vol. 9. pp. 217–224

Zsidisin, G.A., Melnyk, S.A .and Ragatz, G. L. "An institutional theory of business continuity planning for purchasing and supply chain management", *International Journal of Production Research*, Vol. 43 No. 16, 2005, pp. 3401-20.

국문초록

공급사슬 보안지향성의 인식에 관한 연구

박홍규 · 정재완

본 연구의 목적은 공급사슬 보안지향성 연구모형을 우리나라 항만과 항만이용자들에게 적용하여 그들의 인식을 분석하는 것에 있다. 또한, SCM분야에서 공급사슬보안이라는 새롭게 등장한 연구주제를 통해 국내항만과 항만이용자들의 인식을 분석하여 보안과 관련된 이슈들에 대해서 어떠한 인식의 차이가 있는지를 보고자 한다. 공급사슬 보안지향성이라는 연구모형과 인터뷰를 통해 제시된 12개 변수들이 항만과 항만 이용자들에게 어떻게 인식되고 있고 그 변화는 통계적으로 유의한지를 살펴보았다. 두 개의 항만으로 이루어진 항만당국그룹과 다양한 기업들로 이루어진 항만이용자그룹으로 분류하여 427개의 설문지답변을 분석하였다. 그들의 답변내용을 바탕으로 간단한 분석을 실시하였고 선행요인, 보안지향성, 항만성과로 이루어진 세 개의 그룹 모두에서 통계적으로 유의한 차이가 두 집단에서 발견되었다. 본 연구를 통해 향후 항만의 보안과 관련된 정책설정에 도움을 줄 수 있으며 향후 보안과 관련한 다양한 계량적, 확인적 연구가 계속해서 수행되어야 할 것이다.

주제어 : 공급사슬 보안지향성, 보안인식, 항만보안

Appendix 1 Questionnaires in Korean

제1부. 항만의 공급사슬 보안지향성에 관한 선행요인

다음은 항만의 공급사슬 보안지향성의 선행요인과 관련한 질문문항들입니다. 다음 기술하고 있는 지표와 관련하여 주요 경쟁사와 비교하여 귀하가 동의하는 정도를 표시해 주시기 바랍니다. (1=강하게 동의하지 않음; 2=동의하지 않음; 3=중립; 4=동의함; 5=아주 동의함; N=답할 수 없음)

항만의 공급사슬 보안지향성의 선행요인	동의하지 않음 ⟷ 동의함					
	1	2	3	4	5	N
리스크 인식과 보안취약성						
1. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련해 내부 IT 시스템의 고장으로 인해 부정적인 경험을 할 수도 있다.						
2. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련해 외부 IT 시스템의 고장으로 인해 부정적인 경험을 할 수도 있다.						
3. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련한 파업, 화재, 사고와 같은 사회정치적인 요인으로 인해 생산능력의 차질이 빚어질 수도 있다.						
4. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련해 낙후된 인프라로 인해 부정적인 경험을 할 수도 있다.						
5. 우리 터미널, 또는 우리가 이용하는 항만은 보안을 위협하는 주요 요소와 원인들을 효과적으로 찾아내고 분석하며 평가해야 한다.						
6. 우리 터미널, 또는 우리가 이용하는 항만은 보안과 관련한 최소한의 자원들을 보유해야 하며 리스크를 감수하는 수준을 설정해야 한다.						
재정적 자원						
7. 우리 터미널, 또는 우리가 이용하는 항만은 필요하다면 물류보안을 위해 투자할 재정적 자원을 보유하고 있다.						
8. 우리 터미널, 또는 우리가 이용하는 항만은 필요하다면 물류보안을 위해 투자할 의향이 있다.						
9. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련한 투자에 높은 우선순위를 둔다.						
10. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안설비를 위한 재원확충을 위해 협력한다.						
국제물류 보안제도						
11. 우리 터미널, 또는 우리가 이용하는 항만은 ISPS CODE와 같은 국제물류 보안제도의 중요성을 인식하고 있다.						
12. 우리 터미널, 또는 우리가 이용하는 항만은 국제물류보안 제도의 도입이 우리 조직의 성과에 긍정적인 영향을 미칠 것이라 생각한다.						
13. 우리 터미널, 또는 우리가 이용하는 항만은 국제물류 보안제도가 미래에 더욱 중요해질 것이라 생각한다. .						

항만의 공급사슬 보안지향성의 선행요인	동의하지 않음 ◄► 동의함					
	1	2	3	4	5	N
14. 우리 터미널, 또는 우리가 이용하는 항만은 ISPS CODE와 같은 강화되는 국제물류보안 제도의 도입과 관련해서 적절한 계획이 수립되어야 한다고 생각한다.						
15. 우리 터미널, 또는 우리가 이용하는 항만은 공급사슬 보안과 관련한 투자가 필요하다고 생각한다.						
16. 우리 터미널, 또는 우리가 이용하는 항만은 국제물류 보안제도와 관련해서 지속적으로 정보수집이 이루어져야 한다고 생각한다.						

제2부. 항만의 공급사슬 보안 지향성

다음은 공급사슬 보안지향성과 관련한 질문문항들입니다. 다음 기술하고 있는 지표와 관련하여 주요 경쟁사와 비교하여 귀하가 동의하는 정도를 평가해 주시기 바랍니다. (1=강하게 동의하지 않음; 2=동의하지 않음; 3=중립; 4=동의함; 5=아주 동의함; N=답할 수 없음)

항만의 공급사슬 보안지향성	동의하지 않음 ◄► 동의함					
	1	2	3	4	5	N
보안계획 수립 및 입안						
1. 우리 터미널, 또는 우리가 이용하는 항만에서 보안 관련 계획을 세우는 임직원은 실제로 그것의 실행에 관여한다.						
2. 우리 터미널, 또는 우리가 이용하는 항만의 보안계획은 선택적으로 리스크가 큰 활동에 집중한다.						
3. 우리 터미널, 또는 우리가 이용하는 항만의 보안계획 입안자들은 실제 현장에서 근무하는 직원들의 조언을 중요하게 생각한다.						
4. 우리 터미널, 또는 우리가 이용하는 항만의 보안과 관련한 대비책은 조직전체의 계획 및 활동과 조직적으로 운영된다.						
5. 우리 터미널, 또는 우리가 이용하는 항만의 보안계획은 정부, 공기업, 비영리단체 등 외부 단체들과 조직적으로 운영된다.						
6. 우리 터미널, 또는 우리가 이용하는 항만의 보안계획은 우리 조직의 내부의 기능적 운영분야와 함께 통합적으로 운영된다.						
물류보안관련 파트너십						
7. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련해서 공급사슬의 구성원들과 지난 몇 년 동안 긴밀히 협력하여 공급사슬 유통경로의 복잡성을 현저하게 줄였다.						
8. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련해 공급사슬 구성원들과 장기적인 관계를 성공적으로 형성해 왔다.						
9. 우리 터미널, 또는 우리가 이용하는 항만과 공급사슬의 구성원들과의 관계는 계약, 의무에 기초하기 보다는 신뢰에 바탕을 두고 있다.						
10. 우리 터미널, 또는 우리가 이용하는 항만과 공급사슬의 구성원들은 장기적인 관계를 형성하고 관리해 나가는데 필요한 내부적인 방침이나 지침이 있다.						

항만의 공급사슬 보안지향성	동의하지 않음 ◀▶ 동의함					
	1	2	3	4	5	N
11. 우리 터미널, 또는 우리가 이용하는 항만을 포함한 공급사슬의 구성원들은 물류보안과 관련한 장기적인 파트너십 관계를 형성하기 위한 가이드라인을 보유하고 있다.						
조직 적응						
12. 우리 터미널, 또는 우리가 이용하는 항만의 목표는 공급사슬 내의 다른 구성원들의 목표와 유사하거나 일치한다.						
13. 우리 터미널, 또는 우리가 이용하는 항만은 공급사슬내의 구성원들과 협력하여 변화를 추진할 의향이 있다.						
14. 우리 터미널, 또는 우리가 이용하는 항만은 공급사슬 내 구성원들과 같이 협력해야 성공할 수 있다고 믿는다.						
15. 우리 터미널, 또는 우리가 이용하는 항만을 포함하는 공급사슬 내 구성원들은 서로 신뢰한다.						
16. 우리 터미널, 또는 우리가 이용하는 항만을 포함하는 공급사슬 내 CEO들은 비슷한 조직운영철학을 공유한다.						
물류보안관련 정보교환 및 정보교환 시스템						
17. 우리 터미널, 또는 우리가 이용하는 항만은 EDI를 사용하여 공급사슬의 구성원들과 보안과 관련한 정보 및 자료를 교환한다.						
18. 우리 터미널, 또는 우리가 이용하는 항만은 공급사슬 구성원들과 자료 및 정보를 공유하기 위해 EDI 이외에 별도의 통합된 정보시스템을 사용한다.						
19. 우리 터미널, 또는 우리가 이용하는 항만은 컴퓨터화된 시스템을 이용하여 물류보안업무를 운영한다.						
20. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안을 위해 최신 IT 정보통신 기술을 사용한다.						
21. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련한 화물 선적 및 추적관련 정보를 고객들에게 제공한다.						
물류보안 문화						
22. 우리 터미널, 또는 우리가 이용하는 항만은 전 임직원들에게 물류보안의 중요성에 대해서 강조한다.						
23. 우리 터미널, 또는 우리가 이용하는 항만은 전 임직원들에게 물류보안이 전체업무의 일반적인 표준이 되도록 강조한다.						
24. 우리 터미널, 또는 우리가 이용하는 항만은 전 임직원들이 물류보안에 특별한 관심을 쏟는 조직이 되도록 노력한다.						
25. 우리 터미널, 또는 우리가 이용하는 항만은 전 임직원들이 물류보안과 관련해서 항상 경계를 늦추지 않도록 노력한다.						
물류보안 교육						
26. 우리 터미널, 또는 우리가 이용하는 항만은 임직원들을 위한 물류보안관련 교육, 훈련 프로그램을 진행한다.						
27. 우리 터미널, 또는 우리가 이용하는 항만은 경쟁기업, 공급업자, 고객 등의 물류보안과 관련한 훌륭한 업무수행절차를 벤치마킹한다.						
28. 우리 터미널, 또는 우리가 이용하는 항만은 내부 물류보안역량을 평가하기 위해서 계획된 보안 교육 프로그램을 진행한다.						
29. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안 업무에 뛰어난 사람을 고용하고 승진시킨다.						
30. 우리 터미널, 또는 우리가 이용하는 항만은 물류보안과 관련한 교육은 장기적인 투자이며 서비스의 질을 높여주는 역할을 할 것으로 여긴다.						

제3부. 항만성과

다음은 경쟁력 및 성과와 관련한 질문문항들입니다. 다음 기술하고 있는 성과 지표와 관련하여 주요 경쟁사와 비교하여 귀사의 성과를 평가해 주시기 바랍니다. (1=강하게 동의하지 않음; 2=동의하지 않음; 3=중립; 4=동의함; 5=아주 동의함; N=답할 수 없음)

항만성과	동의하지 않음 ↔ 동의함					
	1	2	3	4	5	N
서비스 효과성 지표						
1. 우리 터미널, 또는 우리가 이용하는 항만은 고객에 대한 서비스를 신뢰성 있게 제공하고 있다.						
2. 우리 터미널, 또는 우리가 이용하는 항만은 계약에 명시된 또는 통상 예상되는 작업시간 안에 화물을 처리한다.						
3. 우리 터미널, 또는 우리가 이용하는 항만은 고객의 불만 제기 회수가 적은 편이다.						
4. 우리 터미널, 또는 우리가 이용하는 항만은 고객이 요구하는 작업시간 안에 화물을 처리한다.						
5. 우리 터미널, 또는 우리가 이용하는 항만은 서비스 제공에 소요되는 시간이 짧다.						
6. 우리 터미널, 또는 우리가 이용하는 항만은 화물운송과 관련된 정보를 정확하게 제공한다.						
7. 우리 터미널, 또는 우리가 이용하는 항만은 의사결정에 소요되는 시간이 짧다.						
8. 우리 터미널, 또는 우리가 이용하는 항만은 고객의 요구에 따라 화물처리 스케줄, 처리 절차의 변경에 대한 의사결정이 신속하다.						
서비스 효율성 지표						
9. 우리 터미널, 또는 우리가 이용하는 항만의 크레인당 연간 화물처리량은 만족스러운 수준이다.						
10. 우리 터미널, 또는 우리가 이용하는 항만의 면적당 화물 처리량은 만족스러운 수준이다.						
11. 우리 터미널, 또는 우리가 이용하는 항만의 선박대기 시간은 만족스러운 수준이다.						
12. 우리 터미널, 또는 우리가 이용하는 항만의 선박작업 시간은 만족스러운 수준이다.						
13. 우리 터미널, 또는 우리가 이용하는 항만의 컨테이너 당 양/적하 시간은 만족스러운 수준이다.						
14. 우리 터미널, 또는 우리가 이용하는 항만은 화물이 육상 운송모드(트럭, 열차)으로 이전되는데 소요되는 시간은 짧은 편이다.						
15. 우리 터미널, 또는 우리가 이용하는 항만은 화물이 진입하여 최종 빠져 나오는데 소요되는 시간이 짧은 편이다.						