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A Study on Passengers' Safety Awareness Regarding Items Carried on Board Aircraft

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ABSTRACT

The purpose of this study is to determine whether passengers can accurately judge whether or not items can be brought on board an aircraft. And it aims to identify differences in perceived risk depending on the type of product and confirm whether this has an effect on the judgment of possibility of import. The number of cases of prohibited items being carried on board exceeded 800,000 as of October 2023, and according to Korea Airports Corporation, the number of cases of prohibited items being carried on board increased by 19.5% from a year ago to 802,578 due to the early recovery in demand for international flights. The airport authority said that if this trend continues, the number of cases detected this year is expected to reach one million. In order to determine whether passengers' judgments about carry-on items are related to the risk level of the items, a study was conducted on approximately 179 members of the public, dividing them into awareness, experience, perception, and risk level of carry-on times. The collected data was statistically processed through data coding and cleaning processes, and then analyzed using the SPSS v. 25.0 statistical package program.

Key Words : Carry-On Item, Safety Awareness, Security Check, Hazardous Items, Cabin Safety Management

Ⅰ. Introduction

1.1 Background

The September 11, 2001 terrorist attacks in the United States were the largest terrorist attack in human history. They hijacked four American airliners and crashed them into buildings including the World Trade Center and the Pentagon, killing more than 2,500 people, including 265 on board and 2,267 on the ground. The terrorists hijacked the aircraft by threatening the crew using legally carried items(Kang and Ahn, 2004). As a result of this aviation terrorist incident, aviation security has been strengthened internationally, and new organizations and systematic security have been implemented in aviation and airports. Additionally, aviation security in many countries has applied the same level of screening to all passengers and baggage(Kim, 2011). According to Article 32, Paragraph 1 of the Aviation Safety and Security Act, items prohibited from being carried onboard aircraft and checked baggage are categorized(Kim, 2013). As such, because aviation security is not a problem for

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just one country, international organizations have made multifaceted efforts to strengthen civil aviation security worldwide. In particular, ICAO(International Civil Aviation Organization) recognized the importance of security early on and established many regulations and various improvement programs to contribute to the development of international civil aviation security(Lee, 2019). However, despite various efforts, items brought onto aircraft are being used for in-flight disturbances and terrorism, posing a serious threat to the safety of passengers and air operations. In this way, items prohibited from being brought on board an aircraft are directly related to aviation safety and security, and are also important for the safe use of aviation by passengers boarding the aircraft. Since aircraft accidents usually result in the death of all on board, prior safety assurance and maintenance of order are required rather than after-the-fact relief measures(Jang, 2014).

1.2 Purpose

The purpose of this study was to determine whether passengers can accurately judge the possibility of bringing items on board an aircraft based on accurate criteria, and whether the type of item affects their perception of risk and their judgment of the possibility of bringing items on board. As of October 2023, the number of cases of prohibited carry-on items exceeded 800,000. According to Korea Airports Corporation, the number of cases of prohibited items being caught onboard increased by 19.5% from a year ago to 802,578 due to the early recovery in international flight demand. The airport authority said that if this trend continues, the number of cases detected this year is expected to reach one million(Park, 2023). Ultimately, it is about taking precautions in advance, accurately publicizing carry-on items, and properly understanding and considering fixed perspectives according to the type of items. Passengers should also be aware that carelessness with carry-on items increases that threat onboard the aircraft. This study was conducted on approximately 179 members of the general public, dividing them into awareness, experience, perception, and risk regarding carry-on items.

II. Literature Review

2.1 Previous Research

Previous studies have investigated the potential impact on aircraft operation and risk improvement in relation to operational and management systems, legal considerations, punishment measures, and legal standards related to items carried on board aircraft. There has been no research, like this one, on the accuracy of information on passengers' carry-on items and the relationship between risk and judgment according to type.

Park(2016) studied the operation and management system, introduction of equipment and new technologies, and institutional improvement related to air cargo, passengers' baggage, airport and cargo terminals, focusing on Incheon Airport after the 9/11 terriorist attacks. Seo(2022) pointed out insignificant punishment and methods of laws related to hazardous items on board and sought more effective countermeasures. Kim(2020) pointed out the legal standards for portable electronic devices(PED) used on board, examined the causes, damage, and risks of fire and explosion accidents caused by lithium-ion batteries used as power sources for PED, and conducted research on supplementary and revised laws that can reduce the accident rate and spread of damage. Jeon(2023) proposed a security management system for preemptive response to poten-

tial cyber threats through electronic devices that use wireless networks and internet services in aircraft among in-flight items, strengthening the availability of wireless network services in aircraft, and countermeasures to ensure the safety of aircraft operation from cyber threats. Jang(2014) studied the insufficient standards for prohibited items on aircrafts, inadequate screening systems, and lack of publicity. In addition, research was conducted on issues of response and sanctions, such as confiscation of prohibited items, detention, sale, disposal, and insufficient punishment for bringing dangerous items on board. Lee(2019) sought ways to reduce cases of non-detection due to human error in security screening and to prevent difficulties related to prohibited items from passengers in advance.

Ⅲ. Empirical Research

3.1 Data Analysis Method

The collected data was statistically processed through data coding and cleaning processes, and then analyzed using SPSS v.25.0 statistical package program. Firstly, frequency analysis was conducted to determine the general characteristics. Secondly, a cross-analysis was conducted to determine the awareness, experience, perception, and risk level of carry-on items and to determine whether there were differences according to the general characteristics.

3.2 Research Results

3.2.1 Awareness and Experience

The following are the results of a cross-analysis conducted to find out about awareness and experience of carry-on items and to determine if there are difference based on the general characteristics of the survey.

Table 1. General characteristics

Config.		Freq. (N)	Percent (%)
Gen.	Male	97	54.2
	Female	82	45.8
Age	10s/20s	65	36.3
	30s	34	19.0
	40s	30	16.8
	50s	27	15.1
	60s & over	23	12.8
Job	Employee	45	25.1
	Student	50	27.9
	Housewife	29	16.2
	Unemployed	25	14.0
	Etc.	30	16.8
Residence	Metropolitan	122	68.2
	Other area	57	31.8
Flight purpose	Business	14	7.8
	Travel	153	85.5
	Transportation	8	4.5
	Etc.	4	2.2
Total		179	100.0

3.2.1.1 Recognition of carry-on items

The results of the analysis are shown in Table 2. There were statistically significant differences by gender, occupation, and residential are($p<.05$). Since these parts are statistical results based on simple observations, there may be limitations in fully understanding the level of awareness of in-flight items.

3.2.1.2 Awareness of different standards for carry-on items by airline

The results of the analysis are shown in Table 3. There were statistically significant differences across occupations($p<.05$). Lack of information and consistency on the part of airlines may be the reason for not being fully aware that carry-on items have different standards for each airline. And because there is only little concern about airline regulations and carry-on items during travel plans.

Table 2. Recognition of carry-on items

Config.		Recognition		χ^2 (p)
		Known	Unknown	
Gen.	Male	84(86.6)	13(13.4)	8.738** (.003)
	Female	56(68.3)	26(31.7)	
Age	10s/20s	49(75.4)	16(24.6)	5.709 (.222)
	30s	26(76.5)	8(23.5)	
	40s	26(86.7)	4(13.3)	
	50s	24(88.9)	3(11.1)	
	60s & over	15(65.2)	8(34.8)	
Job	Employee	42(93.3)	3(6.7)	10.268** (.036)
	Student	35(70.0)	15(30.0)	
	Housewife	21(72.4)	8(27.6)	
	Unemployed	21(84.0)	4(16.0)	
	Etc.	21(70.0)	9(30.0)	
Residence	Metro.	103(84.4)	19(15.6)	8.681** (.003)
	Other area	37(64.9)	20(35.1)	
Flight purpose	Business	13(92.9)	1(7.1)	6.630 (.085)
	Travel	119(77.8)	34(22.2)	
	Transport.	4(50.0)	4(50.0)	
	Etc.	4(100.0)	0(.0)	
Total		140(78.2)	39(21.8)	

*p<.05, **p<.01.

Table 3. Awareness of different airline standards

Config.		Different airline standards		χ^2 (p)
		Known	Unknown	
Gen.	Male	17(17.5)	80(82.5)	.569 (.451)
	Female	11(13.4)	71(86.6)	
Age	10s/20s	14(21.5)	51(78.5)	4.852 (.303)
	30s	5(14.7)	29(85.3)	
	40s	3(10.0)	27(90.0)	
	50s	5(18.5)	22(81.5)	
	60s & over	1(4.3)	22(95.7)	
Job	Employee	13(28.9)	32(71.1)	12.282* (.015)
	Student	9(18.0)	41(82.0)	
	Housewife	4(13.8)	25(86.2)	
	Unemployed	1(4.0)	24(96.0)	
	Etc.	1(3.3)	29(96.7)	
Residence	Metro.	20(16.4)	102(83.6)	.164 (.686)
	Other area	8(14.0)	49(86.0)	
Flight purpose	Business	4(28.6)	10(71.4)	2.618 (.454)
	Travel	23(15.0)	130(85.0)	
	Transport.	1(12.5)	7(87.5)	
	Etc.	0(.0)	4(100.0)	
Total		28(15.6)	151(84.4)	

*p<.05.

3.2.1.3 Awareness of different standards for international/domestic flights

The results of the analysis are shown in Table 4. There were statistically significant differences by gender, occupation, and residential are(p<.05). Female, young people, and employees seem to be relatively well aware that the standards for carry-on items are different for international and domestic flights.

This is likely because they travel by air more often and have more opportunities to learn about the standards for carry-on items on international and domestic flights.

Table 4. Awareness of different standards for international/domestic flights

Config.		Different standards for international/ domestic		χ^2 (p)
		Known	Unknown	
Gen.	Male	21(21.6)	76(78.4)	4.153* (.042)
	Female	29(35.4)	53(64.6)	
Age	10s/20s	20(30.8)	45(69.2)	13.476** (.009)
	30s	11(32.4)	23(67.6)	
	40s	13(43.3)	17(56.7)	
	50s	6(22.2)	21(77.8)	
	60s & over	0(.0)	23(100.0)	
Job	Employee	17(37.8)	28(62.2)	9.809* (.044)
	Student	13(26.0)	37(74.0)	
	Housewife	12(41.4)	17(58.6)	
	Unemployed	4(16.0)	21(84.0)	
	Etc.	4(13.3)	26(86.7)	
Residence	Metro.	30(24.6)	92(75.4)	2.127 (.145)
	Other area	20(35.1)	37(64.9)	
Flight purpose	Business	4(28.6)	10(71.4)	2.053 (.561)
	Travel	41(26.8)	112(73.2)	
	Transport.	4(50.0)	4(50.0)	
	Etc.	1(25.0)	3(75.0)	
Total		50(27.9)	129(72.1)	

*p<.05, **p<.01.

3.2.1.4 Experience with returning and disposing of items when checking in luggage

The results of the analysis are shown in Table 5. There were statistically significant different across occupations($p<.05$). As a results, there is quite a lot of experience with returning and disposing of luggage. The reason seems to be that some people are not familiar with baggage return and disposal regulations, or even if they know the regulations, they do not follow them. There was differences in the level of experience depending on the occupation, but it was found to be high among employees. This is because employees often travel by air more frequently when on business trips or on vacation, so they often have experience returning or discarding their luggage.

Table 5. Experience with returning and disposing of items when checking in luggage

Config.		Returning and disposing when checking in luggage		χ^2 (p)
		Yes	No	
Gen.	Male	45(46.4)	52(53.6)	2.759 (.097)
	Female	28(34.1)	54(65.9)	
Age	10s/20s	20(30.8)	45(69.2)	6.115 (.191)
	30s	14(41.2)	20(58.8)	
	40s	15(50.0)	15(50.0)	
	50s	11(40.7)	16(59.3)	
	60s & over	13(56.5)	10(43.5)	
Job	Employee	26(57.8)	19(42.2)	10.819* (.029)
	Student	13(26.0)	37(74.0)	
	Housewife	10(34.5)	19(65.5)	
	Unemployed	10(40.0)	15(60.0)	
	Etc.	14(46.7)	16(53.3)	
Residence	Metro.	51(41.8)	71(58.2)	.165 (.684)
	Other area	22(38.6)	35(61.4)	
Flight purpose	Business	8(57.1)	6(42.9)	3.839 (.279)
	Travel	59(38.6)	94(61.4)	
	Transport.	5(62.5)	3(37.5)	
	Etc.	1(25.0)	3(75.0)	
Total		73(40.8)	106(59.2)	

*$p<.05$.

3.2.1.5 Experience in returning and disposing of items during security checks

The results of the analysis are shown in Table 6. There were statistically significant differences by gender and occupation($p<.01$). As mentioned earlier, employees tend to travel abroad more often, so it is believed that they have a lot of experience encountering these regulations.

3.2.2 Awareness of Carry-on Items

3.2.2.1 Chemical substances

1) Possible to bring container containing chemicals

The results of the analysis are shown in Table 7. There were no statistically differences in general characteristics($p>.05$). It was revealed that it is thought that bringing containers

Table 6. Experience in returning and disposing of items during security checks

Config.		Returning and disposing during security checks		χ^2 (p)
		Yes	No	
Gen.	Male	46(47.4)	51(52.6)	9.028** (.003)
	Female	21(25.6)	61(74.4)	
Age	10s/20s	17(26.2)	48(73.8)	9.039 (.060)
	30s	15(44.1)	19(55.9)	
	40s	15(50.0)	15(50.0)	
	50s	8(29.6)	19(70.4)	
	60s & over	12(52.2)	11(47.8)	
Job	Employee	27(60.0)	18(40.0)	18.466** (.001)
	Student	11(22.0)	39(78.0)	
	Housewife	7(24.1)	22(75.9)	
	Unemployed	12(48.0)	13(52.0)	
	Etc.	10(33.3)	20(66.7)	
Residence	Metro.	45(36.9)	77(63.1)	.049 (.826)
	Other area	22(38.6)	35(61.4)	
Flight purpose	Business	9(64.3)	5(35.7)	5.623 (.131)
	Travel	53(34.6)	100(65.4)	
	Transport.	4(50.0)	4(50.0)	
	Etc.	1(25.0)	3(75.0)	
Total		67(37.4)	112(62.6)	

**$p<.01$.

Table 7. Possible to bring container containing chemicals

Config.		Container containing chemicals			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	1(1.0)	86(88.7)	10(10.3)	.498 (.780)
	Female	1(1.2)	75(91.5)	6(7.3)	
Age	10s/20s	1(1.5)	60(92.3)	4(6.2)	6.398 (.603)
	30s	0(.0)	32(94.1)	2(5.9)	
	40s	0(.0)	25(83.3)	5(16.7)	
	50s	1(3.7)	24(88.9)	2(7.4)	
	60s & over	0(.0)	20(87.0)	3(13.0)	
Job	Employee	1(2.2)	39(86.7)	5(11.1)	4.013 (.856)
	Student	0(.0)	47(94.0)	3(6.0)	
	Housewife	0(.0)	26(89.7)	3(10.3)	
	Unemployed	0(.0)	23(92.0)	2(8.0)	
	Etc.	1(3.3)	26(86.7)	3(10.0)	
Residence	Metropolitan	2(1.6)	109(89.3)	11(9.0)	.952 (.621)
	Other area	0(.0)	52(91.2)	5(8.8)	
Flight purpose	Business	0(.0)	12(85.7)	2(14.3)	2.407 (.879)
	Travel	2(1.3)	139(90.8)	12(7.8)	
	Transport.	0(.0)	7(87.5)	1(12.5)	
	Etc.	0(.0)	3(75.0)	1(25.0)	
Total		2(1.1)	161(89.9)	16(8.9)	

containing chemicals on board is impossible. This suggests that people perceive chemicals to be highly risky.

The results of the analysis are shown in Table 8. there were statistically significant differences by gender(p<.05). Overall, the chemicals appear to have been deemed highly hazardous onboard. This is considered to be a high risk regardless of the amount of chemical.

2) Possible to bring self-defense spray(tear gas, pepper spray, etc. of 100mL or less)

3.2.2.2 Sharp or pointed object

1) Possible to bring razor, cutter, multi-purpose knife, folding knife, etc.

There were statistically significant differences by age and occupation(p<01). Although there

Table 8. Possible to bring tear gas, pepper spray, etc. of 100mL or less

Config.		Tear gas, pepper spray, etc. of 100mL or less			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	28(28.9)	46(47.4)	23(23.7)	7.654* (.022)
	Female	10(12.2)	45(54.9)	27(32.9)	
Age	10s/20s	14(21.5)	37(56.9)	14(21.5)	12.154 (.144)
	30s	8(23.5)	19(55.9)	7(20.6)	
	40s	6(20.0)	16(53.3)	8(26.7)	
	50s	6(22.2)	13(48.1)	8(29.6)	
	60s & over	4(17.4)	6(26.1)	13(56.5)	
Job	Employee	10(22.2)	28(62.2)	7(15.6)	11.412 (.179)
	Student	10(20.0)	28(56.0)	12(24.0)	
	Housewife	4(13.8)	15(51.7)	10(34.5)	
	Unemployed	5(20.0)	9(36.0)	11(44.0)	
	Etc.	9(30.0)	11(36.7)	10(33.3)	
Residence	Metropolitan	28(23.0)	61(50.0)	33(27.0)	.695 (.706)
	Other area	10(17.5)	30(52.6)	17(29.8)	
Flight purpose	Business	3(21.4)	9(64.3)	2(14.3)	3.435 (.753)
	Travel	33(21.6)	76(49.7)	44(28.8)	
	Transport.	2(25.0)	3(37.5)	3(37.5)	
	Etc.	0(.0)	3(75.0)	1(25.0)	
Total		38(21.2)	91(50.8)	50(27.9)	

*p<.05.

may be some differences depending on age and occupation, it is generally believed that all sharp objects are items that cannot be brought on board(Table 9).

2) Possible to bring scissors and knives with blades length of 6cm or less

The results of the analysis are shown in Table 10. There were statistically significant differences across occupations(p<.01). Awareness of whether scissors and knives with blades less than 6cm in length can be carried on board was lower than awareness of whether razor, cutters, multi-purpose knives, and folding knives can be carried on board. This suggests that although sharp objects such as

Table 9. Possible to bring razor, cutter, multi-purpose knife, folding knife, etc.

Config.		Razor, cutter, multi-purpose knife, folding knife, etc.			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	5(5.2)	90(92.8)	2(2.1)	3.519
	Female	8(9.8)	69(84.1)	5(6.1)	(.172)
Age	10s/20s	12(18.5)	52(80.0)	1(1.5)	33.592 *** (.000)
	30s	1(2.9)	31(91.2)	2(5.9)	
	40s	0(.0)	30(100.0)	0(.0)	
	50s	0(.0)	27(100.0)	0(.0)	
	60s & over	0(.0)	19(82.6)	4(17.4)	
Job	Employee	3(6.7)	42(93.3)	0(.0)	24.684 ** (.002)
	Student	10(20.0)	39(78.0)	1(2.0)	
	Housewife	0(.0)	26(89.7)	3(10.3)	
	Unemployed	0(.0)	23(92.0)	2(8.0)	
	Etc.	0(.0)	29(96.7)	1(3.3)	
Residence	Metropolitan	12(9.8)	104(85.2)	6(4.9)	5.041
	Other area	1(1.8)	55(96.5)	1(1.8)	(.080)
Flight purpose	Business	0(.0)	14(100.0)	0(.0)	3.151
	Travel	12(7.8)	134(87.6)	7(4.6)	(.790)
	Transport.	1(12.5)	7(87.5)	0(.0)	
	Etc.	0(.0)	4(100.0)	0(.0)	
Total		13(7.3)	159(88.8)	7(3.9)	

**p<.01, ***p<.001.

Table 10. Possible to bring scissors and knives with blades length of 6cm or less

Config.		Scissors & knives			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	28(28.9)	58(59.8)	11(11.3)	2.971
	Female	21(25.6)	44(53.7)	17(20.7)	(.226)
Age	10s/20s	22(33.8)	36(55.4)	7(10.8)	13.918 (.084)
	30s	10(29.4)	20(58.8)	4(11.8)	
	40s	7(23.3)	15(50.0)	8(26.7)	
	50s	4(14.8)	21(77.8)	2(7.4)	
	60s & over	6(26.1)	10(43.5)	7(30.4)	
Job	Employee	8(17.8)	36(80.0)	1(2.2)	21.264 ** (.006)
	Student	18(36.0)	25(50.0)	7(14.0)	
	Housewife	7(24.1)	12(41.4)	10(34.5)	
	Unemployed	7(28.0)	13(52.0)	5(20.0)	
	Etc.	9(30.0)	16(53.3)	5(16.7)	
Residence	Metropolitan	36(29.5)	69(56.6)	17(13.9)	1.364
	Other area	13(22.8)	33(57.9)	11(19.3)	(.506)
Flight purpose	Business	3(21.4)	11(78.6)	0(.0)	7.453 (.281)
	Travel	44(28.8)	82(53.6)	27(17.6)	
	Transport.	2(25.0)	5(62.5)	1(12.5)	
	Etc.	0(.0)	4(100.0)	0(.0)	
Total		49(27.4)	102 (57.0)	28(15.6)	

**p<.01.

knives are perceived as dangerous, there is tendency to think that knives less than 6cm long are relatively less dangerous.

3) Possible to bring nail clippers

The results of the analysis are shown in Table 11. There were no statistically significant differences in general characteristics(p>.05). The reason why no significant difference was found seems to be because nail clippers are commonly seen and used in everyday life, so the risk on board was judged to be low. Another reason why it was determined that nail clippers could be brought on board is that although the blades are sharp, their use on board is limited, so it appears that they were judged to be low risk.

4) Possible to bring tweezers

The results of the analysis are shown in Table 12. There were statistically significant

Table 11. Possible to bring nail clippers

Config.		Nail clippers			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	35(36.1)	30(30.9)	32(33.0)	.270
	Female	27(32.9)	28(34.1)	27(32.9)	(.874)
Age	10s/20s	27(41.5)	24(36.9)	14(21.5)	12.465 (.132)
	30s	12(35.3)	9(26.5)	13(38.2)	
	40s	12(40.0)	8(26.7)	10(33.3)	
	50s	8(29.6)	10(37.0)	9(33.3)	
	60s & over	3(13.0)	7(30.4)	13(56.5)	
Job	Employee	21(46.7)	14(31.1)	10(22.2)	13.445 (.097)
	Student	17(34.0)	20(40.0)	13(26.0)	
	Housewife	12(41.4)	7(24.1)	10(34.5)	
	Unemployed	7(28.0)	8(32.0)	10(40.0)	
	Etc.	5(16.7)	9(30.0)	16(53.3)	
Residence	Metropolitan	46(37.7)	39(32.0)	37(30.3)	1.869
	Other area	16(28.1)	19(33.3)	22(38.6)	(.393)
Flight purpose	Business	5(35.7)	4(28.6)	5(35.7)	6.761 (.343)
	Travel	49(32.0)	52(34.0)	52(34.0)	
	Transport.	5(62.5)	1(12.5)	2(25.0)	
	Etc.	3(75.0)	1(25.0)	0(.0)	
Total		62(34.6)	58(32.4)	59(33.0)	

Table 12. Possible to bring tweezers

Config.		Tweezers			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	38(39.2)	24(24.7)	35(36.1)	.449 (.799)
	Female	35(42.7)	17(20.7)	30(36.6)	
Age	10s/20s	31(47.7)	11(16.9)	23(35.4)	17.082* (.029)
	30s	18(52.9)	7(20.6)	9(26.5)	
	40s	13(43.3)	5(16.7)	12(40.0)	
	50s	8(29.6)	11(40.7)	8(29.6)	
	60s & over	3(13.0)	7(30.4)	13(56.5)	
Job	Employee	19(42.2)	12(26.7)	14(31.1)	7.791 (.454)
	Student	24(48.0)	7(14.0)	19(38.0)	
	Housewife	13(44.8)	7(24.1)	9(31.0)	
	Unemployed	10(40.0)	7(28.0)	8(32.0)	
	Etc.	7(23.3)	8(26.7)	15(50.0)	
Residence	Metro.	50(41.0)	31(25.4)	41(33.6)	1.826 (.401)
	Other area	23(40.4)	10(17.5)	24(42.1)	
Flight purpose	Business	6(42.9)	4(28.6)	4(28.6)	7.640 (.266)
	Travel	58(37.9)	35(22.9)	60(39.2)	
	Transport.	6(75.0)	1(12.5)	1(12.5)	
	Etc.	3(75.0)	1(25.0)	0(.0)	
Total		73(40.8)	41(22.9)	65(36.3)	

*p<.05.

Table 13. Possible to bring soybean and red paste

Config.		Soybean and red paste			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	42(43.3)	36(37.1)	19(19.6)	1.263 (.532)
	Female	39(47.6)	24(29.3)	19(23.2)	
Age	10s/20s	34(52.3)	22(33.8)	9(13.8)	11.040 (.199)
	30s	12(35.3)	14(41.2)	8(23.5)	
	40s	16(53.3)	10(33.3)	4(13.3)	
	50s	10(37.0)	9(33.3)	8(29.6)	
	60s & over	9(39.1)	5(21.7)	9(39.1)	
Job	Employee	17(37.8)	18(40.0)	10(22.2)	9.202 (.326)
	Student	25(50.0)	19(38.0)	6(12.0)	
	Housewife	17(58.6)	7(24.1)	5(17.2)	
	Unemployed	10(40.0)	8(32.0)	7(28.0)	
	Etc.	12(40.0)	8(26.7)	10(33.3)	
Residence	Metropolitan	62(50.8)	35(28.7)	25(20.5)	5.391 (.068)
	Other area	19(33.3)	25(43.9)	13(22.8)	
Flight purpose	Business	1(7.1)	8(57.1)	5(35.7)	13.619* (.034)
	Travel	73(47.7)	49(32.0)	31(20.3)	
	Transport.	3(37.5)	3(37.5)	2(25.0)	
	Etc.	4(100.0)	0(.0)	0(.0)	
Total		81(45.3)	60(33.5)	38(21.2)	

*p<.05.

differences according to age(p<.05). Overall, it appears that the decision was made to allow the carrying of tweezers on board. There were differences in awareness by age group, which is thought to be due to differences in awareness of aviation safety, management and interest in hazardous materials, and information on carry-on items.

3.2.2.3 Liquid, spray, gel

1) Possible to bring soybean and red pepper paste

The results of the analysis are shown in Table 13.

Statistically significant differences were found depending on the flight purpose(p<.05). In the case of soybean and red pepper paste, there was a statistical difference because the carry-on standards for domestic and international flights were different.

2) Possible to bring cosmetics in spray or gel form, toiletries(toothpaste, shampoo, etc.)

The results of the analysis are shown in Table 14. There were statistically significant differences by gender, age, and occupation(p<.05). In toiletries, there were many differences depending on age and occupation. Depending on age, it may have to do with cultural differences between generations, lifestyles, travel experiences, etc. Additionally, differences by occupation may be related to work tendencies, travel purposes, and frequency of cosmetic use.

Table 14. Possible to bring cosmetics in spray or gel, toiletries(toothpaste, shampoo, etc.)

Config.		Cosmetics in spray or gel, toiletries			χ^2 (p)
		Yes	No	Not sure	
Gen.	Male	58(59.8)	34(35.1)	5(5.2)	10.038 ** (.007)
	Female	40(48.8)	25(30.5)	17(20.7)	
Age	10s/20s	28(43.1)	29(44.6)	8(12.3)	16.064 * (.041)
	30s	20(58.8)	12(35.3)	2(5.9)	
	40s	18(60.0)	10(33.3)	2(6.7)	
	50s	17(63.0)	6(22.2)	4(14.8)	
	60s & over	15(65.2)	2(8.7)	6(26.1)	
Job	Employee	21(46.7)	20(44.4)	4(8.9)	18.634 * (.017)
	Student	22(44.0)	23(46.0)	5(10.0)	
	Housewife	15(51.7)	7(24.1)	7(24.1)	
	Unemployed	18(72.0)	4(16.0)	3(12.0)	
	Etc.	22(73.3)	5(16.7)	3(10.0)	
Residence	Metropolitan	73(59.8)	36(29.5)	13(10.7)	4.030 (.133)
	Other area	25(43.9)	23(40.4)	9(15.8)	
Flight purpose	Business	6(42.9)	7(50.0)	1(7.1)	8.983 (.175)
	Travel	86(56.2)	47(30.7)	20(13.1)	
	Transport.	2(25.0)	5(62.5)	1(12.5)	
	Etc.	4(100.0)	0(.0)	0(.0)	
Total		98(54.7)	59(33.0)	22(12.3)	

*p<.05, **p<.01.

3.2.3 Risk level of carry-on items

3.2.3.1 Risk level of sharp or pointed objects

The results of the analysis are shown in Table 15. There were statistically significant differences according to age(p<.05). The overall level of awareness of the risks of self-defense sprays was rated mostly as 'high' and 'very high'. This is because it may cause confusion on board the plane, with results similar to those of self-defense sprays.

3.2.3.2 Risk level of liquids and gels

The results of the analysis are shown in Table 16. There were no statistically significant differences in general characteristics(p>.05). It was shown to have a relatively low risk compared to other items, and it is thought that there is a lack of accurate information about the risk of liquids and gels, or that there is only little interest in the items.

Table 15. Risk level of sharp or pointed objects

Config.		Risk level of sharp or pointed objects					χ^2 (p)
		Very low	Low	Aver.	High	Very high	
Gen.	Male	0 (.0)	1 (1.0)	2 (2.1)	32 (33.0)	62 (63.9)	4.559 (.207)
	Female	0 (.0)	0 (.0)	5 (6.1)	34 (41.5)	43 (52.4)	
Age	10s/20s	0 (.0)	1 (1.5)	2 (3.1)	16 (24.6)	46 (70.8)	24.442 * (.018)
	30s	0 (.0)	0 (.0)	1 (2.9)	13 (38.2)	20 (58.8)	
	40s	0 (.0)	0 (.0)	1 (3.3)	9 (30.0)	20 (66.7)	
	50s	0 (.0)	0 (.0)	0 (.0)	13 (48.1)	14 (51.9)	
	60s & over	0 (.0)	0 (.0)	3 (13.0)	15 (65.2)	5 (21.7)	
Job	Employee	0 (.0)	0 (.0)	1 (2.2)	10 (22.2)	34 (75.6)	20.386 (.060)
	Student	0 (.0)	1 (2.0)	2 (4.0)	13 (26.0)	34 (68.0)	
	House-wife	0 (.0)	0 (.0)	1 (3.4)	14 (48.3)	14 (48.3)	
	Un-employed	0 (.0)	0 (.0)	2 (8.0)	11 (44.0)	12 (48.0)	
	Etc.	0 (.0)	0 (.0)	1 (3.3)	18 (60.0)	11 (36.7)	
Residence	Metro-politan	0 (.0)	1 (.8)	5 (4.1)	46 (37.7)	70 (57.4)	.681 (.878)
	Other area	0 (.0)	0 (.0)	2 (3.5)	20 (35.1)	35 (61.4)	
Flight purpose	Business	0 (.0)	0 (.0)	0 (.0)	2 (14.3)	12 (85.7)	9.435 (.398)
	Travel	0 (.0)	1 (.7)	6 (3.9)	61 (39.9)	85 (55.6)	
	Trans-port.	0 (.0)	0 (.0)	1 (12.5)	3 (37.5)	4 (50.0)	
	Etc.	0 (.0)	0 (.0)	0 (.0)	0 (.0)	4 (100.0)	
Total		0 (.0)	1 (.6)	7 (3.9)	66 (36.9)	105 (58.7)	

*p<.05.

Table 16. Risk level of liquids and gels

Config.		Risk level of liquids & gels					X^2 (*p*)
		Very low	Low	Aver.	High	Very high	
Gen.	Male	1 (1.0)	24 (24.7)	28 (28.9)	29 (29.9)	15 (15.5)	9.110 (.058)
	Female	0 (.0)	12 (14.6)	38 (46.3)	16 (19.5)	16 (19.5)	
Age	10s/20s	1 (1.5)	14 (21.5)	27 (41.5)	12 (18.5)	11 (16.9)	14.233 (.581)
	30s	0 (.0)	8 (23.5)	15 (44.1)	8 (23.5)	3 (8.8)	
	40s	0 (.0)	8 (26.7)	8 (26.7)	7 (23.3)	7 (23.3)	
	50s	0 (.0)	2 (7.4)	11 (40.7)	9 (33.3)	5 (18.5)	
	60s & over	0 (.0)	4 (17.4)	5 (21.7)	9 (39.1)	5 (21.7)	
Job	Employee	1 (2.2)	11 (24.4)	13 (28.9)	10 (22.2)	10 (22.2)	15.776 (.469)
	Student	0 (.0)	10 (20.0)	21 (42.0)	11 (22.0)	8 (16.0)	
	House-wife	0 (.0)	3 (10.3)	14 (48.3)	6 (20.7)	6 (20.7)	
	Un-employed	0 (.0)	6 (24.0)	7 (28.0)	6 (24.0)	6 (24.0)	
	Etc.	0 (.0)	6 (20.0)	11 (36.7)	12 (40.0)	1 (3.3)	
Resi-dence	Metro-politan	1 (.8)	27 (22.1)	40 (32.8)	33 (27.0)	21 (17.2)	3.536 (.472)
	Other area	0 (.0)	9 (15.8)	26 (45.6)	12 (21.1)	10 (17.5)	
Flight purpose	Business	0 (.0)	5 (35.7)	2 (14.3)	4 (28.6)	3 (21.4)	6.829 (.869)
	Travel	1 (.7)	28 (18.3)	58 (37.9)	40 (26.1)	26 (17.0)	
	Trans-port.	0 (.0)	2 (25.0)	4 (50.0)	1 (12.5)	1 (12.5)	
	Etc.	0 (.0)	1 (25.0)	2 (50.0)	0 (.0)	1 (25.0)	
Total		1 (.6)	36 (20.1)	66 (36.9)	45 (25.1)	31 (17.3)	

Ⅳ. Conclusion

4.1 Interpretation and Results

This study examined whether passengers can accurately judge whether various items can be carried on board, and looked into whether the perceived level of risk for each type of item affected the decision on whether or not it could be brought on board. The main analysis results are as follow.

First, differences in understanding and experience with carry-on baggage regulations emerged across different groups participating in air travel. In general, the survey respondents were aware of carry-on items, but the level of awareness varied depending on gender, occupation, and residential area. This shows that understanding and experience of air travel services and regulations can vary widely across participants. Therefore, airlines and related organizations should take this diversity into account to provide travelers with clearer and more effective guidance on carry-on items and consider improving services and regulations to provide a better travel experience.

Second, there was an overall difference in the judgment ratio regarding whether or not items could be brought on board depending on the items. This revealed uncertainty regarding the items as they had different regulations across countries and airlines. This can be confusing for passengers due to the incovenience of having to be aware of multiple criteria. It can also be a burden not only to passengers but also to airlines and airport staff. Because it can affect the overall efficiency and quality of air travel, it is necessary to improve regulations on goods and to enhance the convenience of air travel by providing information through education, publicity and marketing.

Third, the risk ratio for each carry-on item showed a similar pattern to the judgment ratio. This suggests that passengers tend to refer to risk assessment criteria when judging specific items. Additionally, the fact that a greater proportion of respondents were unaware that this differed by country and airline proves that their risk assessments by item are being in-

fluenced. When information is insufficient, decisions are made on one's own judgment. As this may cause confusion in aviation safety, it it believed that passengers need to understand the regulations and policies regarding carry-on items.

4.2 Implication

The results of this study suggest that when passengers are unclear about the standards or are ignorant about the risks involved in their judgments regarding carry-on items, their judgments are influenced by the level of risk. Airline passengers' awareness of aviation safety information shows a significant relationship with their attitudes and behavioral intentions toward safe behavior. Therefore, in order to expect positive results for aviation safety, such as high awareness of passengers regarding aviation safety information and a favorable attitude toward safe behavior, the Ministry of Land, Infrastructure and Transport and airlines need to engage in various activities, such as active event promotion, media promotion, and educational promotion, to raise awareness of the necessity and importance of aviation safety(Choi, 2017). If the analysis results of this study can increase passengers' understanding of carry-on items, it will be helpful in improving aviation safety.

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