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[Field Research]

## A Study of Cross-border Trade in Second-hand Goods\*

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### Abstract

**Purpose** - The purpose of this research was to examine the regulation and distribution channel of second-hand goods in cross-border trade in order to propose methods of protecting consumers through the international standardization of the intensifying second-hand trade and resource recycling.

**Research design, data, methodology** - This study first defines several concepts relevant to research in international second-hand goods. Second, a questionnaire and interviews were conducted with manufacturers of second-hand toner cartridges and automobile parts to identify the current status of export and manufacturing.

**Results** - The study proposes the international standardization of second-hand goods and waste to protect consumers and promote efficient resource recycling.

**Conclusions** - The results of the study reveal that second-hand goods (except automobiles) do not have an HSK code to use for import/export data collection. Though used car exports are declining, used cars are increasing. Collecting data on used car parts is impossible because the buyers purchase and ship the second-hand parts.

**Keywords** : Second-Hand Goods, Recycling of Resource, Guarantee System, International Trade, HSK Code.

**JEL Classifications** : F10, L50, L60, N70, Q20.

### 1. Introduction

Many nations have introduced strategies to promote recycling and reduce waste in order to promote environmental conservation and economic growth. Waste is recovered from the deconstruction and crushing of products and is then traded

overseas or thrown out. Waste products must be disposed rationally, and their appropriate distribution is becoming an important resource recycling system issue. Recycling waste is reasonable to do on behalf of significant resources. Second-hand goods such as construction machinery, machine tools, vessels, and aircraft have long been traded, in a trend that now applies to durable consumer goods such as electronics and automobiles. Second-hand goods have caused health, safety, and environmental issues. They also waste resources because few remanufacturing efforts have been taken to extract rare metals from them. To alleviate these problems, the international trade and efficient recycling of second-hand goods as well as internationally binding standards and tracking of those goods are required. This study examines the mandatory control and distribution channel of second-hand goods and international standard trials designed to protect consumers in the second-hand goods trade. This study focuses on two categories of goods. The first comprises electronic goods such as mobile phones, PCs, refrigerators, TVs, and automobiles, the data for which are based on trade returns and export statistics kept by the Korea Customs Service. The second category comprises remanufacturing goods such as automobile parts and toner cartridges. The study employed questionnaires and telephone interviews with CEOs.

### 2. Research on Trade in Second-Hand Goods

#### 2.1. Definition of Second Hand-Goods as Recycling Resource

energy supply, construction, agricultural and stockbreeding production, or other human activities.

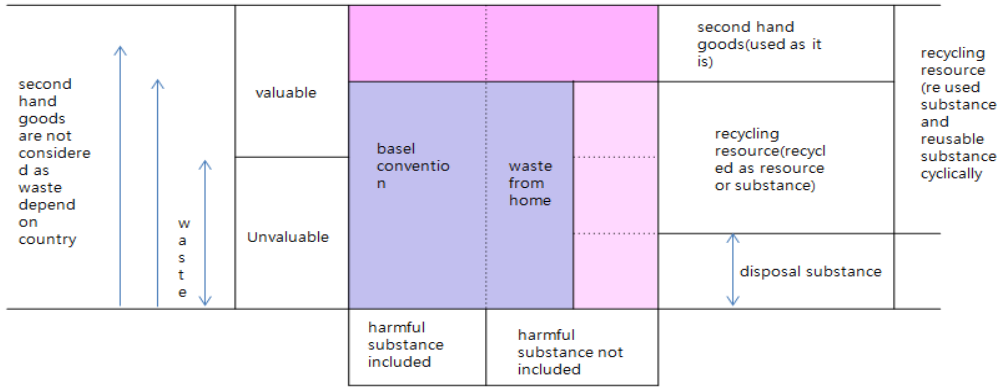
Though organic matter is included as waste in the Basel Convention, some nations do not certify it as such (see Figure 1).

The term "recycling" refers to any activity that promotes reuse or remanufacturing for reuse. The recycling of resources targets-renewable resources and the reuse of second-hand goods. Renewable resources comprise usable resources or potentially usable resource among closed goods or accessories. Second-hand goods comprise usable goods that require only

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source: Kojima (2007).

<Figure 1> Definition of recycled substances, second-hand goods, recycled resources, and waste.

cleaning or repair, in contrast to remanufactured goods, produced from the collection, disassembling, cleaning, inspection, adjustment, or reassembling processes. The "extended producer responsibility" underlines the producer's responsibility to recycle wastes, and the producer's rate of recycling is set by Korean law. Export for recycling is regulated by the "Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal." Only PCs among electricity and electronic goods are involved in second-hand goods export.

2.2. Regulation of Second-Hand Goods Trade

While the second-hand goods trade has promoted resource recycling, it has complicated goods disposal because of the goods' short life expectancy. As developing countries do not have the technology to repair home appliances or automobiles, their second-hand goods quickly become waste and cause pollution. The goods become dumped waste rather than being reused or renewed.

The exhaust from used automobiles causes air pollution, and the cars are abandoned after short periods of use in Mongolia and other west coast countries. Waste disposal exports from developed countries to developing ones are prohibited under the Basel Convention.

The trade and industry departments regulated second-hand goods exports through the Foreign Trade Act and export and import notification processes until 1998. However, these regulations were abolished to simplify the procedure. Table 1 describes the import regulations for second-hand goods.

<Table 1> Import embargo on recycling resource

Regulation	Contents	Notes
Embargo	export/import ban	- Basel Convention prohibited export of wastes from developed countries to developing countries for disposal. - Indonesia: Ban on trade in waste plastics - Thailand: Ban on waste tires, import embargo on second-hand electronic goods more than three years old.
Temporary admission & approval	import/export, preliminary government review of trade	Principle of Basel Convention (need permission of government of importing nation) import of second-hand machinery needs permission from government of China. - import/export of waste in Korea needs permission of Environment Department.
Inspection before shipment	inspection before shipment by importing government to satisfy import standards	Inspection before shipment of reusable resources such as waste paper, plastics, and iron scrap is obligatory in China. Inspection before shipment of printed material is obligatory in Indonesia for religious reasons.
Taxation on second-hand goods based on production year	high taxation rate on old products	High taxation rate on old automobiles in Mongolia.
Enrollment of importers	enrollment system for importers	Enrollment system for reusable resource importers in China. Enrollment system for waste tires importers in Singapore.
Enrollment of exporters	enrollment system for exporters	Enrollment system for reusable resource exporters in China.
International declaration	Collection of declaration from export factory	Recycling factory at export site records declaration on internet business in Taiwan.
Inspection of factory at export site	Inspection of factory at export site by local government or lain government	Inspection of factory at export site by local government or lain government in Taiwan.

Source: Kojima (2008).

### 2.3. Standard Judgment of Second-Hand Goods

Each nation regulates electric and electronic goods because of the waste goods trade. However, international regulations have not reflected Korea's regulation or classification of second-hand electric and electronic goods and waste, as shown in Table 2.

<Table 2> Standards for second-hand electric and electronic goods and waste

Second-hand electric/electronic goods	Electric/electronic waste
- reuse for sale, distribution contract, and invoice attached - official document of export evaluation or result of experiment attached to proof of second-hand goods	- imported for recycling or disposal - damage causes abnormal function - waste or parts prohibited under domestic law - waste electric/electronic goods for parts usage

Source: Ministry of Environment (2010)

<Table 3> Standards for hazardous electronic goods waste in Australia

Questions		Answer	Activities
Q1	Is equipment potentially dangerous?	Yes	To Q2.
		No	Equipment is not harmful waste possible to export without permission.
Q2	Does equipment have documentation to prove that the equipment is not waste?	Yes	Export without permission if approved as non-waste.
		No	To Q3.
Q3	Is equipment or part treated as mentioned in the law, such as for recycling	Yes	The equipment is harmful waste and cannot be exported.
		No	To Q4.
Q4	Was equipment measured using the appropriate procedure?	Yes	To Q5.
		No	Unmeasured equipment is considered harmful waste, so export is impossible without permission.
Q5	Was measurement based on procedure used for harmful waste?	Yes	Judged to be harmful waste, thus cannot be exported without permission.
		No	To Q6
Q6	Are the test results presented as per the appropriate documentation procedure?	Yes	As it is non-harmful waste based on test results, the documented equipment can be exported without permission.
		No	The undocumented equipment test results confirmed as waste cannot be exported without permission.

Source: Australian Department of the Environment and Heritage (2012)

Table 4 describes the advance notice and approval processes for the recovered mobile phone trade pursuant to the mobile phone partnership settled by the Basel Convention in 2006 (Kojima, 2008).

<Table 4> Guidelines for the recovered mobile phone trade

1) Reused goods and goods exported after inspection are treated as brand new.
2) Goods exported without inspection and considered waste require notification.
3) Repaired goods (even though inspected) and harmful waste disposed after repair require notification.
4) Repaired goods (even though inspected) and harmful waste disposed after repair do not require notification.

Even though written consent and the lack of denial is generally considered prior approval, this guideline has no legal force. Table 5 presents Japan's standards for second-hand TV exports.

<Table 5> Standards for second-hand TVs in Japan

Item	Standard	Proof from exporter
Year	Within 15 years after production	Keep record of individual production year, formation, maker keep this handy in case it is required
Appearance	The following items cannot be approved for second-hand export: - goods in a damaged packing box - goods with damaged or severely depleted Braun tubes - recalled items or items recalled because of safety problems	Keep for inspection if required
Confirmation of operation	Communicate inspection for confirmation of operation	Record confirmation of operation of individual item and keep it handy in case it is required
Packaging & load situation	- Keep Braun tubes; do not destroy them - use packaging and careful loading to prevent damage during transit	Exporter records packaging and loading situation (at least 3)and keeps it handy in case it is required
Secure second-hand good's seller	Verify purpose of reusable item with exporter country	Record seller name, address, and picture of sale location, and keep it handy in case it is required

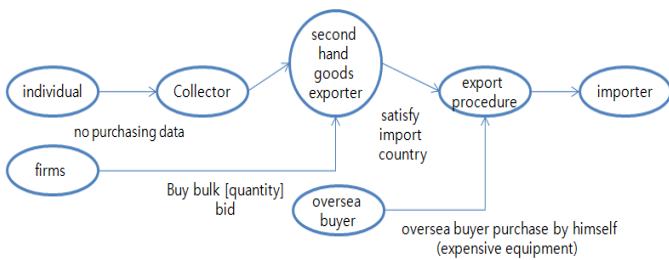
Source: Ministry of Economy, Trade and Industry (2009)

Thus, both imported and exported goods are regulated. As

the trade in second-hand goods grows, the need to regulate them as waste intensifies while trading such goods as renewable resources intensifies the need to regulate second-hand goods as well. Defining the nature of the resources and goods for export is thus required.

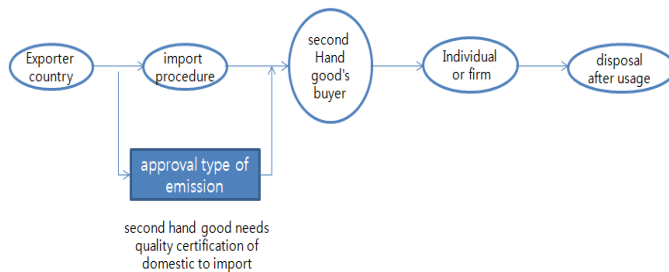
### 3. International Distribution Channel for Second-Hand Goods

This section reviews the international distribution of second-hand goods. Figure 2 shows the process of exporting valuable second-hand goods purchased from collectors.



<Figure 2> Export channel for second-hand goods

There is no source for the pricing and volume of second-hand PC bulk buying because the business is so small. Items recorded on traders' business cards differ because of differing buyer requirements and because expensive items such as medical appliances are traded directly with overseas buyers; there is thus no export accounting record in such cases. Due to the applicable import regulations, second-hand electric and electronic goods are exported with no second-hand goods mark or are treated as scrap. Korea has difficulty recording its exports because it does not assign an HS code for second-hand goods except for used cars. Japan has assigned an HS code for reusable items such as TVs, air conditioners, washing machines, refrigerators, and computers. As second-hand goods imports must pass through a quality approval procedure, they are handled almost the same as are imports of new products.



<Figure 3> Import channel for second-hand goods

Many illegal import methods have been used to, for example, import goods difficult to pass through the approvals process because of exhaust or noise issues; moreover, some goods are

banned shortly after been imported illegally and are then sold. In order to avoid customs inspection, motor cycles are documented as import goods such as used motorcycles, used broken motorcycles, or used broken motorcycle parts (motorcycles are excluded by the Air Quality Preservation Act). Noise, vibration, and exhaust issues are regulated by the Automobile Management Act. In spite of their high prices, there is no international standard test or pricing for second-hand medical appliances. Tracing the exporters of such appliances is difficult because there is no harmonized system, and the distribution channels are unclear because of the lack of tracking management

### 4. Second-Hand Goods and the Production and Export of Remanufacture

This section discusses the production and export of remanufactured toner cartridges and automobile parts based on telephone interviews and questionnaires conducted with goods remanufacturers.

#### 4.1. Toner Cartridges

Table 6 shows that the domestic production of toner cartridges reached 7,190 (ea) thousands in 2008 for a value of 6,690 billion won. The number of remanufactured cartridges reached 1850 (ea), about 25.8% of the total, for a value of 820 billion won, about 12.3% of the total value.

<Table 6> Domestic toner cartridge market

Classification		2007		2008	
		Quantity (1000 ea)	Sum (100 million)	Quantity (1000 ea)	Sum (100 million)
Genuine	black-white cartridge	4,450	4,450	4,284	4,284
	color cartridge	680	1,020	1,259	1,589
	sub total	5,130	5,470	5,343	5,873
Remanufactured	black-white cartridge	1,203	432	1,499	540
	color cartridge	197	158	349	280
	sub total	1,400	590	1,848	820
Total		6,530	6.06	7,191	6,693

Source: Korea Cartridge Recycling Association (2008)

As they are less than 30% of the price of manufactured goods, remanufactured goods have a price-based rate less than their numbers might otherwise suggest. The number of remanufactured toners in Korea is 250 to 300 EA. There are 5,000 EA remanufacture factories in the US, which remanufacture 2,700 EA every year. This amount cuts crude oil expenditures by one ton and eliminates 384 kg worth of solid

waste. An annual savings of 60 thousand tons of crude oil and 23 thousand tons of environmental waste cuts expenses. Thus, remanufacturing induces a large resource recycling effect. Europe has 1,640 EA remanufacture factories and a 24.7% re-manufactured goods market share. Table 7 below is based on questionnaires and telephone interviews conducted with 50 CEOs of toner remanufacture factories. The table shows that the factories are very small and in the early development stages, as they have fewer than 20 employees and average annual sales of about 600 million won.

Waste cartridges are not only a significant resource but can also create environmental pollution. The Korea Cartridge Recycling Association (2006) states that Korea wastes 2,000 ea cartridges every year, among which only 17% are recycled 83% of wasted cartridges have been reclaimed or incinerated. Our questionnaires suggest that the domestic cartridge remanufacture industry has systemic weaknesses: it has insufficient manufacturing technology and market power, Chinese remanufacturing represents 50% of the global total, and Korea's remanufacturing enterprises are small. The quality of remanufactured toner car-

<Table 7> Interviews with cartridge recycling manufacturers

No	Company name	Number of employee	Phone number	Fax	Address
1	Simwontech. Ltd	19	02-572-0069	02-3463-0069	Seoul gumchungu gasan-dong 319 hosseo dae venture tower 408
2	Daesungtechnology, Ltd	21	042-274-6071	042-274-6070	Daejeon donggu sangsodong 622-4
3	Wonwootech. Ltd	10	02-999-0606	02-991-1456	Seoul nowongu wolgye2dong wolgyetechnotown 702
4	Cosmos. Ltd	24	032-544-7060	032-544-7023	Incheon. gyeyanggu hyusungdong 567-2
5	JKOA. Ltd	55	031-906-5646	031-906-5645	Gtunggido goyang ilsangu janghangdong 557-13
6	EP Land	12	032-865-8386	032-865-8387	Gyunggido goyang ilsangu janghangdong 557-13
7	Ep Tech	7	02-2634-5808	02-2634-5807	Seoul Gunchungu gasandong 60-5 gabeultrad vally A-806
8	Hanjin Tech	27	032-817-0250	032-817-0252	Incheon namdong gu gojandong670-12 namdonggukgasanup91B13L
9	Haesung Tplon. Ltd	30	02-717-5411	02-717-6437	Seoul yongsangu shinchangdong56-2
10	Cyclon. Ltd	5 (contract work:40)	051-941-0308	051-941-0310	Busan gangsuhyu songjungdong 1506-11

Source: Korea Cartridge Recycling Association (2011)

Although, as Table 8 shows, the number of domestic toner remanufactures is increasing, their sales are decreasing. Thus, the goods' market prices have clearly not yet been smoothly established.

tridges and consumer welfare are affected by the inflow of unlicensed Chinese toners, and the small scale of the domestic cartridge remanufacture/refill industry could negatively impact the rest of Korea's remanufacture industry.

<Table 8> Remanufactured toner cartridge sales/production

No	Company name	Sale (million won)			Production (ea)		
		2010	2011	Percentage change	2010	2011	Percentage change
1	Simwontech. Ltd	1,400	1,200	▽14%	28,000	21,000	▽25%
2	Daesung technology, Ltd	3,100	3,051	▽ 2%	70,000	74,000	△ 6%
3	Wonwootech. Ltd	175	143	▽18%	30,000	26,000	▽13%
4	Cosmos. Ltd	2,913	1,859	▽36%	80,000	80,000	0%
5	JKOA. Ltd	4,900	4,100	▽16%	170,000	150,000	▽12%
6	Ep Land	1,500	1,500	0%	100,000	110,000	△10%
7	Ep Tech	500	600	△20%	20,000	24,000	△20%
8	Hanjin Tech	1,800	2,000	△11%	110,000	120,000	△ 9%
9	Haesung Teplon. Ltd	3,800	3,500	▽ 8%	-	-	-
10	Cyclon. Ltd	1,200	1,200	0%	80,000	100,000	△25%
Total		21,288	19,153	▽10%	688,000	705,000	△ 2%

Source: Korea Cartridge Recycling Association (2011)

## 4.2. Automobile Parts

Self-reliance in the domestic remanufacture of automobile parts is insufficient because of hand waving systematization and because manufacturers and module corporations profit from the black market. Hence, no formal data are maintained. The Korea Remanufacturing Industry for Automobile Parts (KRA) states that the domestic parts market has reached three trillion 500 billion won, while the market for remanufactured parts has reached 240 billion won and represented 7% of the market in 2010. The 2,000 remanufacturers could not increase their market share, however, because 60% of them were very small. The number of employees working for automobile parts remanufacturers was estimated at 4,000, the defective rate was 5 to 10%, and their market price was 20 to 40% of that of new products.

<Table 9> Estimation of automobile parts remanufacturing market

Items	Estimated number of remanufacturers	Estimated number of products	Estimated market scale (100 million won)	Notes
Generator start motor	270	1,100,000	250	
CV joint	320	1,400,000	240	
Caliper	45	300,000	10	
Power pump	25	200,000	6	
Power steering gear	75	70,000	45	
Transmission	350	50,000	60	
Lower arm/upper arm	15	250,000	20	
Other (shock absorber, injector, catalyst, turbo, throttle body, fan clutch, water pump, air flow sensor, high pressure pump, auto fan, auto pulley)	380	-	1,700	
Sub total	1,480	3,370,000	2,331	

Source: Korea Automobile Parts Remanufacture Association (2010)

The KRA reports that there are 350 remanufacturers of transmissions, 320 remanufacturers of CV joints, and 270 remanufacturers of generators and starter motors. However, there are few remanufacturers of power steering gears and parts (see Table 9). The parts circulating in the market are for brand new cars, and most remanufactured parts are for old models such as the Sonata (I, II, III, and EF), Verna, and Prince, which have been discontinued for over ten years and no longer circulate in the domestic market. The KRA states that exports of remanufactured products are very rare. Most remanufactured export products consist of parts for new or used car exports. However, their buyers, located in the main exporting regions such as Mongolia, the Middle East, and Africa, dislike remanufactured parts and usually import used parts instead. The credibility of remanufacturing quality is very low, and used parts are often locally disassembled. Given this situation, this study questioned 25 KRA members out of the organization's total of 400, representing at least 200 million won in annual sales, to learn about the export/import and in/out flow of remanufactured automobile parts. Questionnaires and interviews were used to cover three years of data. Twelve firms responded to the research questions (see Table 10).

The sales amounts, output, export amounts, and export rates of the above firms from 2009 to 2011 are presented in tables 11 to 13, which show that Joowon-retech exported all of the batteries remanufactured in 2009, 99% in 2010, and 97% in 2011 this represents the highest export rate among all the firms. The export rate is less than 20% of the total sales amount for all firms except Jangsoo shover.

<Table 10> Interviewed automobile parts remanufacturers

No	Company name	Main product	Phone	Fax	Address
1	Haein Eng	power steering	031-797-3311	031-797-0409	gyunggido gwangju
2	Jennis	low arm	031-574-7445	031-574-7446	gyunggido namyangju
3	Youngnam Eng	constant velocity joint	051-971-0598	051-941-7969	Busan gangsuheung
4	Daegyo Company	constant velocity joint	041-857-7883	041-857-7886	chungnam gongju
5	Daedo Company	constant velocity joint	053-586-2975	053-586-2976	Daegu dalsung
6	Donjin Absorber	shock absorber	031-372-9183	031-373-9184	Gyunggi osan
7	Jangsu Absorber	shock absorber	031-574-5514	031-574-5518	gyunggido namyangju
8	Juwonretech. Ltd	battery	032-572-3831	032-572-3832	Incheon seogu
9	Pro Junjang	junjang parts	062-955-3399	062-955-3404	Gwangju gwangsan
10	T&T Motors	wheel length parts	062-944-8582	062-944-8546	Gwangju gwangsan
11	Daehan Lining	caliper	031-446-6038	02-2612-6048	gyunggido siheung
12	Ojung Head	engine head	032-568-6341	032-561-6395	Incheon seogu

Source: Korea Automobile Parts Remanufacture Association (2010).

&lt;Table 11&gt; Export of remanufactured automobile parts (2009)

No	Company name	Main product	2009				
			Sale amount (100 million)	Number of products (ea)	Export amount(100 million)	Export rate (%)	Number of exports (ea)
1	Haein Eng	power steering	5.0	43,000	0.4	8.0%	3,440
2	Jennis	low arm	1.6	23,000	0.2	13.5%	3,105
3	Youngnam Eng	constant velocity joint	5.6	73,000	-	0.0%	-
4	Daegyo Snagsa	constant velocity joint	5.0	66,000	0.1	1.0%	660
5	Daedo Sanup	constant velocity joint	6.0	75,000	0.5	8.0%	6,000
6	Donjin Absorber	shock absorber	2.2	18,000	-	0.0%	-
7	Jangsu Absorber	shock absorber	3.0	24,000	1.1	36.0%	8,640
8	Juwonretech. Ltd	battery	0.7	2,300	0.7	100.0%	2,300
9	Projunjang	junjang parts	5.0	42,000	0.4	7.0%	2,940
10	T&T Motors	wheel length parts	5.1	18,600	-	0.0%	-
11	Daehan Lining	caliper	7.0	84,000	1.1	15.0%	12,600
12	Ojung Head	engine head	2.5	3,450	0.1	2.5%	86

Source: Korea Automobile Parts Remanufacture Association (2010)

&lt;Table 12&gt; Export of remanufactured automobile parts (2010)

No	Company name	Main product	2010				
			Sale amount (100 million)	Number of products (ea)	Export amount(100 million)	Export rate (%)	Number of exports (ea)
1	Haein Eng	power steering	7.0	60,200	0.6	8.5%	5,117
2	Jennis	low arm	5.4	77,625	0.8	14.0%	10,868
3	Youngnam Eng	constant velocity joint	6.6	86,036	-	0.0%	-
4	Daegyo Snagsa	constant velocity joint	7.0	92,400	0.1	1.5%	1,386
5	Daedo Sanup	constant velocity joint	7.2	90,000	0.6	8.3%	7,470
6	Donjin Absorber	shock absorber	2.6	21,273	-	0.0%	-
7	Jangsu Absorber	shock absorber	3.5	28,000	1.4	39.5%	11,060
8	Juwonretech. Ltd	battery	3.9	12,650	3.8	99.0%	12,526
9	Projunjang	junjang parts	5.3	44,520	0.4	8.4%	3,740
10	T&T Motors	wheel length parts	5.4	19,694	0.1	1.0%	197
11	Daehan Lining	caliper	8.0	96,000	1.5	19.0%	18,240
12	Ojung Head	engine head	2.8	3,864	0.1	2.9%	112

Source: Korea Automobile Parts Remanufacture Association (2010).

&lt;Table 13&gt; Export of remanufactured automobile parts (2011)

No	Company name	Main product	2011				
			Sale amount (100 million)	Number of product (ea)	Export amount(100 million)	Export rate (%)	Number of exports (ea)
1	Haein eng	power steering	7.5	64,500	0.6	8.5%	5,483
2	Jennis	low arm	6.1	87,688	1.0	16.0%	14,030
3	Youngnam Eng	constant velocity joint	6.3	82,125	-	0.0%	-
4	Daegyo Snagsa	constant velocity joint	11.0	145,200	0.1	1.0%	1,452
5	Daedo Sanup	constant velocity joint	8.0	100,000	0.8	10.2%	10,200
6	Donjin Absorber	shock absorber	2.1	17,182	-	0.0%	-
7	Jangsu Absorber	shock absorber	4.0	32,000	1.9	47.0%	15,040
8	Juwonretech. Ltd	battery	30.0	98,571	29.1	97.0%	95,614
9	Projunjang	junjang parts	6.0	50,400	0.6	9.8%	4,939
10	T&T Motors	wheel length parts	6.2	22,612	0.1	1.0%	226
11	Daehan Lining	caliper	9.0	108,000	1.8	20.0%	21,600
12	Ojung Head	engine head	3.2	4,416	0.1	3.3%	146

Source: Korea Automobile Parts Remanufacture Association (2011)

Table 14 shows the KRA firms' sales amounts and output trends over the last three years. The domestic output and sales of remanufactured automobile parts have increased. However, most firms had no exports or less than 100 million of exports except for Joowon Retch.

Supply and demand difficulties involving used core parts and a focus on the domestic market have caused the export rate to be lower than the domestic market rate. The Middle East, Mongolia, and East Asia are the main import locations for remanufactured parts, as those countries require them most.

<Table 14> Sale amount and production trends for automobile parts remanufacturers (2009–2011)

No	Company name	Sale amount (million won)				Number of products (ea)			
		2009	2010	2011	Percentage change over 2 years	2009	2010	2011	Percentage change over 2 years
1	Haein Eng	5.0	7.0	7.5	50%	43,000	60,200	64,500	150%
2	Jennis	1.6	5.4	6.1	281%	23,000	77,625	87,688	381%
3	Youngnam Eng	5.6	6.6	6.3	13%	73,000	86,036	82,125	113%
4	Daegyo Snagsa	5.0	7.0	11.0	120%	66,000	92,400	145,200	220%
5	Daedo Sanup	6.0	7.2	8.0	33%	75,000	90,000	100,000	133%
6	Donjin Absorber	2.2	2.6	2.1	▽5%	18,000	21,273	17,182	95%
7	Jangsu Absorber	3.0	3.5	4.0	33%	24,000	28,000	32,000	133%
8	Juwonretech. Ltd	0.7	3.9	30.0	4186%	2,300	12,650	98,571	4286%
9	Projunjang	5.0	5.3	6.0	20%	42,000	44,520	50,400	120%
10	T&T Motors	5.1	5.4	6.2	22%	18,600	19,694	22,612	122%
11	Daehan Lining	7.0	8.0	9.0	29%	84,000	96,000	108,000	129%
12	Ojung Head	2.5	2.8	3.2	28%	3,450	3,864	4,416	128%
13	Samjung Auto Mission	3.0	3.5	4.0	33%	600	700	800	133%
	total	51.7	68.2	103.4	100%	472,950	632,962	813,494	172%

Source: Korea Automobile Parts Remanufacture Association (2011)

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Table 15 presents the KRA members' sales and export amounts, and Table 16 presents their export rates. Even though exports of remanufactured automobile parts have increased, the average annual sales have been less than one billion won and exports less than 10%, which indicates that the export of remanufactured products is still in the initial phase.

However, most exported parts are over 10 years old, and it is difficult to secure core parts, which restrains export growth. However, Joo-won Retch transacts directly. Moreover, the supply of and demand for remanufactured batteries are steady, and the product is easy to export.

<Table 15> Sales and export amounts of remanufactured automobile parts

No	Company name	Main product	2009 sales amount	2009 export amount	2010 sales amount	2010 export amount	2011 sales amount	2011 export amount
1	Haein Eng	power steering	5.0	0.4	7.0	0.6	7.5	0.6
2	Jennis	low arm	1.6	0.2	5.4	0.8	6.1	1.0
3	Youngnam Eng	constant velocity joint	5.6	-	6.6	-	6.3	-
4	Daegyo Snagsa	constant velocity joint	5.0	0.1	7.0	0.1	11.0	0.1
5	Daedo Sanup	constant velocity joint	6.0	0.5	7.2	0.6	8.0	0.8
6	Dnjin Absorber	Shock absorber	2.2	-	2.6	-	2.1	-
7	Jangsu Absorber	shock absorber	3.0	1.1	3.5	1.4	4.0	1.9
8	Juwonretech. Ltd	battery	0.7	0.7	3.9	3.8	30.0	29.1
9	Projunjang	junjang parts	5.0	0.4	5.3	0.4	6.0	0.6
10	T&T Motors	wheel length parts	5.1	-	5.4	0.1	6.2	0.1
11	Daehan Lining	caliper	7.0	1.1	8.0	1.5	9.0	1.8
12	Ojung Head	engine head	2.5	0.1	2.8	0.1	3.2	0.1

Source: Korea Automobile Parts Remanufacture Association (2011)

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&lt;Table 16&gt; Export rates of automobile parts remanufacturers over three years (2009–2011)

No	Company name	Main product	2009 sales amount	2010 sales amount	2011 sales amount
1	Haein Eng	power steering	8.0%	8.5%	8.5%
2	Jennis	low arm	13.5%	14.0%	16.0%
3	Youngnam Eng	constant velocity joint	0.0%	0.0%	0.0%
4	Daegyo Snagsa	constant velocity joint	1.0%	1.5%	1.0%
5	Daedo sanup	constant velocity joint	8.0%	8.3%	10.2%
6	Donjin Absorber	shock absorber	0.0%	0.0%	0.0%
7	Jangsu Absorber	shock absorber	36.0%	39.5%	47.0%
8	Juwonretech. Ltd	Battery	100.0%	99.0%	97.0%
9	Projunjang	junjang parts	7.0%	8.4%	9.8%
10	T&T Motors	wheel length parts	0.0%	1.0%	1.0%
11	Daehan Lining	caliper	15.0%	19.0%	20.0%
12	Ojung Head	engine head	2.5%	2.9%	3.3%

Source: Korea Automobile Parts Remanufacture Association (2011)

### 4.3. Import-Export/Supply-Demand Problems with used and Remanufactured Products

This study found several problems involving resource reuse and recycling through our interviews with employees in the industry.

#### 4.3.1. Second-Hand Goods

The problems and path analyses are described below.

1) Although Korea has a law and a system for resource recycling, the responsibilities of initiators are unclear. There is no law governing managing bodies, responsibilities, or quality certification because there is no management system for second-hand goods. Thus, many usable second-hand goods are wasted.

2) Extended producer responsibility certificates record exports as second-hand goods only for PCs. Because second-hand electric and electronic goods are not certified, producers and importers consider them recyclable waste. Thus, these second-hand goods are treated as scrap metal and have no record of being unused resources from overseas.

3) No after-service or component supply process occurs after product sales. In addition, the lack of a managing system for second-hand goods with guarantees causes environmental problems. Products imported as waste and then changed into new products through the manipulation of core components can cause very serious safety issues.

4) The word "Used" is often omitted from export and import declarations for second-hand goods, while waste is also often declared as used goods. Thus, data on export and import declarations are not reliable. Furthermore, because second-hand goods have no HSK code, it is impossible to track and collect the data needed to manage the goods.

5) Because data analyses are impossible to standardize across organizations (as the data are closed), few data on sec

ond-hand goods are available. Only one organization, the Korea Custom and Trade Development institute, keeps them, and at a very high cost.

6) Because the trade in second-hand goods occurs through personal networks (e.g., internet, personal trading), it is difficult to develop as an industry or complex distribution channel. Mapping the routes taken by second-hand goods is impossible because they consist of small collectors, making data collection impossible.

7) Because there are no clear classification criteria, exporters and importers themselves decide if goods are second hand or waste. Moreover, collecting information on exports and imports is impossible because there are no clear expressions for items on export and import declarations (e.g., LCD monitors are indicated as "CTR" and PCs as "monitors").

8) There are no international agreements on issues such as the inspection criteria, level criteria, or price criteria for second-hand goods exporters and importers follow their own standards. Institutional measures such as those for quality assurance and distribution channel transparency for second-hand goods are required.

#### 4.3.2. Remanufacture

Though environmental regulations for industrial structures have been in force since 2011, this systemic support is not enough. Remanufacturing needs not only core second-hand products as raw material but also capital and technical support. The industry faces problems such as its small scale, incapacity, severe market competition due to its low entrance barrier, insufficient reliability, narrow distribution channel, and weak sale force. In addition, illegal Chinese products, technical barriers, and negative consumer views of genuine goods manufacturers are also serious problems.

The institutional problems facing remanufactured products are as follows.

1) Despite the promotion of environmentally friendly institutional structures, the support for propulsion systems is inadequate. There is no institutional system for inducing support from genuine goods manufacturers.

2) Though there are quality certification standards for some articles, quality, performance, and safety guarantees are often not available.

3) There are no HSK codes for remanufactured products yet. Thus, data on the export/import and inflow/outflow of goods cannot be collected or presented as industry statistics.

4) Violations of the brands, patents, and techniques used by genuine articles are core barriers for the remanufacturing industry.

5) Because small enterprises produce most remanufactured goods, their quality and safety cannot be guaranteed.

6) Government support for the remanufacturing industry is clear as regards resource recycling, but consistent strategies and processes must be followed.

7) In the automobile remanufacturing industry, the inner parts used to replace damaged or consumable genuine articles are required in order to remanufacture without the need for physical changes. However, the supply of and demand for inner parts is a complicated issue.

8) The supply and demand issue involving the core resources of the remanufacturing industry is complicated because genuine goods producers collect all the second-hand parts and then dispose of or recycle them.

9) The main used car importing countries that deal with Korea buy almost 80% of Korea's used cars. Thus, opportunities for remanufacturing are insufficient because of the core supply shortage.

10) Collecting toner cartridges is also difficult because there is no systemic collection program.

Institutional support for changing waste into valuable substances or new products is also required. An additional five suggestions are listed below:

1) HSK codes for collecting data on import/export and inflow/outflow of unused resources:

- HSK codes allow the collection of data and an understanding of the situation, which enhances the industry's credibility.

- Designating resources as national unused resources also requires HSK codes, which can strengthen management control.

2) Collection of waste and the establishment of a core resource recycling system:

Systems for the collection of distributed remanufacturable goods are required. Core remanufacturing resources must be supplied to remanufacturers by separating the core from the recyclable resources. Future exchanges of recycling resources could be considered in order to use waste as a future resource.

3) Quality guarantee for second-hand goods:

A guarantee system is required for second-hand goods distributors, and a qualification standard is needed in order to increase customers' trust in the goods.

4) Technical support and remanufacturer quality guarantee:

Genuine producers need to provide permission for the use of patents, technical support, quality guarantees, and genuine brand usage, and a remanufacturing standard and strategy are needed to nurture the remanufacturable core.

5) Consumer protection through a chase system for second-hand goods and remanufacturers:

A chase system for consumer protection that includes safety, health, environmental, and product information should be required. If the systems described in points 3) and 4) are established, an integrated code system should be enacted to protect the consumers of second-hand and remanufactured goods.

## 5. Legal/Institutional Improvement Plan

Korea's recycling legal regime has developed into a diversified form of legal control, from the Waste Control Act to the five Resource Saving and Recycling Acts. Also, a volume-rate garbage disposal system, extended producer responsibility, and the EcoAS (Equal Credit Opportunity Act) are all now in force. The global resource and energy shortage and climate change have focused attention on the value and sources of waste as a recycling resource. Korea has also established strategies such as a zero-waste objective based on green growth and resource recycling in response to shrinking natural resources.

This study suggests legal and institutional improvements in resource recycling through a review of the import/export and inflow/outflow of second-hand goods. In order to promote green growth, governments, genuine producers, remanufacturers, and consumers must acknowledge waste as a recyclable resource and increase resource value through reuse and remanufacture.

## 6. Conclusions

### 6.1. Study Results and Implications

The purpose of this study was to examine the import and export of second-hand and remanufactured goods in order to propose a virtuous cycle through legal improvements. The study found that second-hand goods (except automobiles) have no HSK codes by which to track or collect import/export data. Though the number of used car exports is declining, the number of used cars is growing. Data collection for used car parts is impossible because their buyers purchase and ship them themselves. This study found that dissolution factories in Daejeon took between 20,000 and 30,000 used cars to pieces and had annual sales of 20 billion won.

Though data collection for home appliances is possible through an inspection of import and export declarations, the costs involved make it impossible. Second-hand PCs, as re-

cycled products, are recorded under the EcoAS. As exporting second-hand PCs is cheaper than recycling them, second-hand PCs are exported at twice the rate at which they are recycled. There are 1,480 automobile remanufacturers, who create 3,370 thousand products, in a market estimated at 2,33 billion won. Their production increased 10% from 2009 to 2011, and their exports are growing. The association of toner cartridge remanufacturers estimates that their products are declining. Though the toner industry is growing, usage of remanufactured toners is declining, and the competitiveness of the industry is very low because of cheap Chinese imports. HSK codes must be assigned to core second-hand goods, and the import and export of recyclable electric and electronic goods and second-hand automobile parts must be regulated in order to divide them from waste. The reclamation of core parts, products, and resources in remanufacturing and restraints on reuse should be prohibited in cases of remanufactured exports. Measures in support of the remanufacturing industry should be enacted to prevent an outflow of resources.

This study has suggested ways of vitalizing the trade in second-hand and remanufactured goods and has also suggested that HSK codes are required for the flow of imports and exports in order to collect data, identify wasted resources, establish a recycling system for core resources, provide quality assurance for recycled goods, provide consultancy and quality assurance for remanufacturers, and regulate the tracking of second-hand and remanufactured goods to enhance consumer trust. These initiatives will not only establish guidelines for the trade in second-hand goods, an increasingly important issue, but will also increase the responsibilities of the suppliers of electronics and automobiles as regards environmental standards and user safety.

## 6.2. Limitations and Future Research

This research focused on only four electric goods (i.e., mobile phones, PCs, refrigerators, TVs) to represent second-hand goods and on automobile parts and cartridges to represent remanufactured goods. It is thus impossible to generalize our result to apply to all industrial trends. Additional analyses of the second-hand trade is required through questionnaires and interviews based on foreign trade statistics and the export amounts reported by EcoAS. An analysis of the trade channels of vari-

ous industries, such as the tiers and apparel industries, is required to increase the safety of the international second-hand goods trade.

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