

# Analysis of the Car Industry Trade Structure between Korea and China\*

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## Abstract

**Purpose** – This study, in seeking to understand the trade structure of both Korea and China, aims to strengthen Korea-China economic cooperation; it examines trade impediments by analyzing the problems affecting trade and addressing these problems, thereby discovering ways to expand trade between these countries.

**Research Design, Data, and Methodology** – The index of trade intensity developed by the trade intensity theory (Kruger, 1997) is used to analyze the trade decision factors of both countries. Although specific factors should have materialized from the analysis of trade decision factors, determining concrete explanations is difficult in reality, as there are many unsolved and diverse factors.

**Results** – First, the index of A value/B value is the index of Korean versus Chinese market share/Korean versus world market share, which is a measure of comparative market intensity. Second, Korea has a comparative advantage in export specialization and, conversely, China has a comparative advantage in import specialization. Third, compared to 2000, the revealed comparative advantage (RCA) indexes are considerably improved.

**Conclusions** – This study used quantitative measurement for analysis, applying trade intensity theory, trade specialization, and RCA indexes to gauge how inter-trade relations have changed between Korea and China during the past 10 years (2000, 2005, and 2012).

**Keywords** : Car Industry, Intensity, Trade Structure, Trade Specialization, Revealed Comparative Advantage.

**JEL Classifications** : F14, F17, L62, L92.

## 1. Introduction

As Northeast Asian countries are adjacent to Northwest coast of Pacific Ocean, in case economic cooperations are intensified, transportation & communication cost could be diminished as well as transaction cost of economic exchanges could be minimized. Furthermore, additionally, commonly comprehensive cultural characters could be contributed to mutual demand expansion as a sufficient condition to spur intra-trade especially, intra-industrial trade.

In particular, among the Northeast Asian countries, the geographical proximity of the two countries to exchange experiences and language through a long history, life, customs, and practices have a lot in common culturally similar to round, and one in the economic aspect, the complementary nature of the two countries culminated.

In view of our economic situation, economic cooperation in Northeast Asia provide opportunities for industrial technology cooperation with China while competition between industries is accelerating of the days and expand and diversify our export markets and to secure a stable source of resources to be a very positive the effect is expected to bring.

The purpose of this study is looking for the problems of the trade to find ways to increase the trade through its direction of the improvement in order to strengthen economic cooperation between the two countries to identify two country's trade structure and to analyze the factors that affect trade structure.

This paper is organized as follows. Chapter II will describe statistical data used in empirical Analysis together with previous studies concerning this research. Chapter III, it will be examined the structural characteristics of the automotive industry between 2 countries by use of general trade statistics. Chapter IV, mutual trade relations will be decomposed and measured through UN Comtrade statistics combined with trade indices, trade specialization index, Revealed Comparative Advantage index. Finally, Chapter V, the results of this study is summarized and finalized completely.

## 2. Previous Research and Statistic Data

In order to analyze trade determinants between 2 countries, trade intensity index was used to analyze by taking advantage

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of Japanese Yamazawa (1970) theory of trade intensity.

To analyze these trade determinant, detailed factor should be identified. However, realistically, there are a lot of unidentified factors as well as its diversity which it is hard to explain specifically. So, I look into to focus on trade structure factor as a mentioned research point, namely, analysis of trade determinant. Analysis period is from 2000 to 2012. From 2000 to 2005 and 2012 are restricted for both 2 countries trade determinant analysis as recent statistical data of international statistical data are not announced or are difficult to get them. Per reviewing previous research, Jang(2008), Lee(2010), Jeong(2011) by trade specialization index, there are analysis research for Han(2005), Kim(2009), Yoo & Han(2012) by revealed comparative advantage index and Kim(2009), Kim & Kim(2011), Jeong(2012) by trade intensity index. This paper has differentiation compared to other papers as above mentioned all 3 indexes are used for study.

This research was done empirical analysis based on statistical data, especially, trade analysis between Korea and China are objective assess. Thus, the position of the two countries with a focus on South Korea, the counterpart country was reviewed. The statistical data published by international organization were mainly used. The main data were made based on Standard International Trade Classification - Revision 3, Korea Customs Office, Korea International Trade Association and UN Comtrade.

### 3. The Status of Car Industry and Characters between Korea and China

Korean manufacturing method requires from domestic production-export to oversea market and from simple oversea production strategy taking advantage of oversea low labor to globalization strategy in pursuit of resource optimal distribution and optimum coupling of manufacturing factor.

These target should be conducted as survival strategy not only Korean economy's everlasting growth and development but also to survive borderless unlimited competition era. This is Korean car industry's urgent assignment. In despite of short Korean car industry, Korean car industry recorded world rank 5 of car manufacturing country in 1994 since 20 years after having been manufacturing independent unique model.

Korean built-in car export has been continuously increased into 300,000 unit in 1986 and over 1 million unit in 1996(KITA 2013). Per export areas, north american market in 1980 is abnormally high dominating 70-80% and have been exported to evenly balanced all over world. Regarding to the Korean big 3 car maker, export ratio against production is over 30% and only Hyundai has his own manufacturing brand in 1980 while KIA and Daewoo have been business through OEM method(KITA 2013). Now, all of manufacturing makers have been exporting by their own brand from 1990. Despite this kind of swift progress, Korean car industry's international competitiveness is still

very vulnerable. It is very contrast that Japanese built-in car has evenly balanced market share such as 37% in small car, 27.5% in medium size car, 20.7% in luxury car and 29.4% in sports car I US market without any big differences against their car grade.

<Table 1> Top 10 Export Item in 2000

Unit: US\$1,000, Ton

Period	Item	HS code	Export weight	Export amount	Trade balance
2000	Electric product	85	2,144,176	46,365,814	10,854,729
2000	Machinery · Comuputer	84	2,378,653	29,732,191	8,859,068
2000	Car	87	2,778,477	15,265,527	13,634,266
2000	Petroleum · Coal	27	40,003,169	9,375,503	-28,701,630
2000	Ship	89	7,216,050	8,229,445	8,036,911
2000	Plastic	39	6,984,473	7,279,677	4,567,468
2000	Steel	72	12,500,325	5,954,688	-35,487
2000	Organic compound	29	8,528,903	4,969,520	-1,056
2000	Filament fiber	54	1,006,532	4,804,218	4,017,919
2000	Knitting	60	364,402	2,522,109	2,426,379

Source : Customs office, KITA 2013

<Table 2> Top 10 Export Item in 2005

Unit: US\$1,000, Ton

Period	Item	HScode	Export weight	Export amount	Trade balance
2005	Electric item	85	2,379,539	80,488,019	31,754,060
2005	Machinery · Computer	84	3,610,932	38,563,249	10,584,838
2005	Car	87	5,541,103	37,491,235	33,298,061
2005	Ship	89	7,610,949	17,231,478	16,094,094
2005	Petroleum · Coal	27	35,847,748	15,709,419	-51,847,050
2005	Plastic	39	9,499,673	14,262,514	8,861,933
2005	Steel	72	15,048,220	12,804,737	-3,555,765
2005	Optical instrument	90	165,476	11,911,050	-967,645
2005	Organic compound	29	10,905,426	10,539,295	2,062,227
2005	Steel product	73	2,483,584	4,425,868	1,872,647

Source : Customs office, KITA 2013

<Table 3> Top 10 Export Item in 2011

Unit: US\$1,000, Ton

Period	Item	HS code	Export weight	Export amount	Trade balance
2011	Electric product	85	2,492,738	118,542,862	48,794,634
2011	Car	87	8,011,982	67,096,998	57,947,004
2011	Machinery · Computer	84	5,965,440	59,658,652	10,330,096
2011	Ship	89	16,200,267	54,133,104	51,729,626
2011	Petroleum · Coal	27	56,597,644	53,088,429	-120,586,577
2011	Optical instrument	90	591,264	36,499,242	19,450,445
2011	Plastic	39	11,915,748	27,719,360	16,869,288
2011	Steel	72	26,801,230	27,581,063	-857,152
2011	Organic compound	29	15,332,920	22,468,839	7,604,440
2011	Steel product	73	4,645,340	11,690,016	4,315,843

Source : Customs office, KITA 2013

<Table 4> Top 10 Export Item in 2013

Unit: US\$1,000, Ton

Period	Item	HS code	Export weight	Export amount	Trade balance
2013	Electric product	85	772,794	41,022,310	18,123,810
2013	Car	87	2,721,168	24,019,422	20,799,425
2013	Machinery · Computer	84	1,849,268	19,645,287	4,471,673
2013	Petroleum · Coal	27	19,550,412	18,647,477	-44,836,514
2013	Optical instrument	90	175,109	12,203,470	6,643,405
2013	Ship	89	4,525,000	11,137,928	10,484,861
2013	Plastic	39	4,476,361	10,186,121	6,618,144
2013	Organic compound	29	5,784,018	8,707,390	3,706,811
2013	Steel	72	8,797,975	7,569,296	375,169
2013	Steel product	73	1,667,706	3,542,638	830,446

Source : Customs office, KITA 2013

Per <Table 1> and <Table 2>, among top 10 export products against world market in 2000 and 2005, The proportion of car is US\$15.26 billion and US\$37.49 billion which is rank 3 after electric item and machinery · computer as a promising export item and its export volume is increased more than 2 times after 5 years. Per <Table 3> and <Table 4>, it is almost 2 times increase after 6 years as US\$67.09 billion in 2011, of which auto-

mobile exports showed robust but in 2013, it is US\$24 billion which shows export performance is significantly poor compared to previous years even though 2nd quarter export data does not come out. This is reason why worldwide economy recession as well as medium & high earners's purchase power is shrank due to construction sector's recession with long-term economic depression. This is worldwide trend including Korea.

<Table 5> Automobile Import & Export Status in Korea

Unit: US\$1,000, Ton

Period	Item	HS code	Export weight	Export amount	Import weight	Import amount	Trade balance
1995	Car	87	1,522,325	9,358,465	146,535	2,070,184	7,288,281
1996	Car	87	1,855,637	11,727,309	162,991	2,256,056	9,471,253
1997	Car	87	2,161,648	12,328,440	157,226	1,925,629	10,402,811
1998	Car	87	2,278,000	11,433,944	66,506	813,756	10,620,189
1999	Car	87	2,519,540	13,144,857	111,868	1,257,748	11,887,109
2000	Car	87	2,778,477	15,265,527	160,276	1,631,262	13,634,266
2001	Car	87	2,680,073	15,400,570	184,952	1,804,875	13,595,695
2002	Car	87	2,899,551	17,266,341	273,152	2,644,369	14,621,971
2003	Car	87	3,709,790	23,024,613	286,941	3,175,267	19,849,346
2004	Car	87	5,028,268	32,106,170	286,051	3,584,939	28,521,231
2005	Car	87	5,541,103	37,491,235	309,572	4,193,174	33,298,061
2006	Car	87	5,923,470	42,605,290	393,381	5,242,003	37,363,287
2007	Car	87	6,498,382	49,162,180	516,193	6,658,601	42,503,579
2008	Car	87	6,360,347	48,333,860	539,907	7,180,813	41,153,047
2009	Car	87	5,096,608	36,531,126	419,894	5,516,332	31,014,794
2010	Car	87	6,873,009	53,445,487	604,719	7,867,147	45,578,340
2011	Car	87	8,011,982	67,096,998	654,905	9,149,995	57,947,004
2012	Car	87	8,273,480	70,074,094	651,497	9,347,245	60,726,849
2013	Car	87	2,721,168	24,019,422	222,851	3,219,996	20,799,425
Total	-	-	82,732,858	589,815,928	6,149,418	79,539,392	510,276,537

Source : Author calculated it based on UN Comtrade data(2012).

<Table 6> Automobile Import & Export Status in China

Unit: US\$1,000, Ton

Period	Nation	Item	HS code	Export weight	Export amount	Import weight	Import amount	Trade balance
1995	China	Car	87	43,197	232,017	4,805	15,314	216,703
1996	China	Car	87	37,325	177,586	4,083	13,673	163,913
1997	China	Car	87	21,743	80,459	9,154	30,059	50,400
1998	China	Car	87	33,089	110,449	3,020	7,544	102,905
1999	China	Car	87	29,792	113,244	9,283	26,243	87,001
2000	China	Car	87	28,295	167,272	19,798	58,913	108,358
2001	China	Car	87	31,696	207,550	21,835	52,334	155,216

2002	China	Car	87	54,228	361,177	41,611	88,272	272,905
2003	China	Car	87	216,829	1,356,680	45,603	100,684	1,255,996
2004	China	Car	87	286,627	2,102,056	56,799	143,933	1,958,123
2005	China	Car	87	408,167	3,222,042	80,685	261,856	2,960,186
2006	China	Car	87	382,232	3,153,018	114,687	457,329	2,695,690
2007	China	Car	87	355,311	2,996,058	169,953	761,972	2,234,086
2008	China	Car	87	323,512	2,791,913	177,910	934,116	1,857,797
2009	China	Car	87	395,953	3,388,463	140,253	824,994	2,563,469
2010	China	Car	87	564,525	5,160,901	206,443	1,231,637	3,929,264
2011	China	Car	87	670,343	6,476,600	229,374	1,499,466	4,977,134
2012	China	Car	87	569,698	5,654,131	196,214	1,437,348	4,216,784
2013	China	Car	87	368,323	3,781,412	123,741	895,048	2,886,364
Total	-	-	-	4,820,886	41,533,027	1,655,251	8,840,733	32,692,294

Source : Author calculated it based on UN Comtrade data(2012).

Comparing with <Table 5> and <Table 6>, we can figure out Korean car import & export status shows steady growth continues overall from 1995 to 2013. This is export promotion policy starting from the time of the Third Republic. From the early days, the export-oriented strategy is labor-intensive industries such as textiles, footwear, clothing industry and then, from the 1990s, main export industry is changing into high value-added industry such as automobile, marine, electronics in Korea. In other words, its industry is moving from NICs, labor-intensive industries to capital-intensive industry. It is not mere industry itself moving. As a source of national wealth is changing fundamentally, we can see significant contribution to increase of national wealth through economic development.

On the other hand, per China from 1995 to the year 2013, as you can see the trend <Table 6>, export is bigger than import in the trade balance as a whole because the low wages of auto workers make profitability of export production and this significantly improves the car's export competitiveness as well as medium, high earners do not have their preference for expensive foreign cars which makes even lower share of imported cars that you can find the factors of trade surplus.

In particular, in 2013, Chinese exports is over 4 times larger than imports that China is expected to compete with Korea in the fierce in the future international car sales market.

<Table 7> Korean car import & export status against China

(Unit: US\$)

Year	2000	2003	2005	2010	2012
Export	\$167,271,560	\$1,356,679,921	\$3,222,042,050	\$5,160,900,687	\$5,654,131,447
Import	\$58,913,188	\$100,683,907	\$261,855,901	\$1,231,636,901	\$1,437,347,890
Trade Balance	\$108,358,372	\$1,255,996,014	\$2,960,186,149	\$3,929,263,786	\$4,216,783,557

Source : Author calculated it based on UN Comtrade data(2012).

As you can see <Table 7>, Korea shows export excess phenomenon as 2 times 13 times larger than import during 2000-2012.

Trade favorable phenomenon between 2 country's industries has been continued, however, after 2010, trade balance drops to over 3 times from over 12 times and as mentioned earlier, it shows that China vehemently pursue Korean car sales market.

## 4. Structural Analysis for Korea-China Car Industry

### 4.1. Empirical analysis model for Korea-China Car Industry

In order to understand the competitiveness of the automobile industry between Korea and China, It is necessary to take advantage of utilizing some of the more traditional method of analysis

It is trade intensity index, trade specialization index and revealed comparative advantage index.

Each measuring index for competitiveness index could be fragmentary analysis method to see only one side as well as problem is implied. However, it is helpful to see trade structure resulting from industrial competitiveness.

Trade intensity index analyze competitive relations of oversea market between 2 countries by relative trade intensity of competitiveness analysis indicator to consider coverall import absorbing power of import country, comparative advantage of export country together with bilateral or global trade flow

Trade specialization index has some problems to consider only bilateral transaction of exporting and importing countries without considering the world's total trade flows.

Revealed comparative advantage index shows realized competitiveness of export country, but, has problem that import absorbing power such as market condition of import country is not taken into account at all.

Trade is accomplished at the point that import demand of import country meets supply power of export country.

However, revealed comparative advantage index has disadvantage that only the relative export proportion of the exporting country is considered.

We can examine specific calculation method as well as index derived from mentioned calculation. Trade intensity index presented by I.Yamazawa shows exporting country's export comparative market intensity against importing country. Thus, trade intensity index can be defined as follows;

Economic meaning of trade intensity is if I country's export proportion against j country is bigger or j country's import ratio against world total import is smaller, this index is going up.

$$I_{ij} = \frac{(X_{ij}/M_{jw})}{(X_{iw}/M_{ww})} \text{-----} (1)$$

$I_{ij}$  = I country's trade intensity against j country

$X_{iw}$  = I country's total export

$M_{jw}$  = j country's total import

$M_{ww}$  = World total import (= Total export)

In case j country export ratio among I country's total export is 1% and j country import is 1% against world total import, this index is 1. Therefore, formular<1> can be changed into formular <1'> as follows

$$I_{ij} = \frac{(X_{ij}/X_{iw})}{(M_{jw}/M_{ww})} \text{-----} (1')$$

numerator of formular(1)' shows I country's share against j country's market and denominator of formular(1)' shows I country's world market share.

Namely, this index means I country's world market share against j country's market share, of which it calls comparative market intensity.

Additionally, to make in-depth analysis about Korea-Sino complementary relationship, we can measure trade specialization degree through qualitative rather than quantitative indicators.

$$\text{<Formular> } TSI = \frac{X_i - M_i}{X_i + M_i}$$

( $X_i$  : Export of certain industry,  $M_i$  : Import of certain industry)

As Trade specialization index(TSI) is between maximum value +1 and minimum value -1, if mentioned index is bigger, it means the competitiveness is strong. If it is 0, export amount equals to import amount which means the active intra-industry trade is done in reality. In case it comes closer into -1 from 0, it means degree of import specialization is high and if it comes closer into +1 from 0, it means degree of export specialization is high. Further more, if TSI is +1, it is perfect export specialization, on the contrary, if TSI is -1, it is perfect import specialization. As it is indicator of relative comparative advantage in the export, it is another indicator to analyze between the two countries or in the world for a particular market. TSI is available to analyze by item, by country at a certain point including time series comparison at the same time which is useful to explain bilateral trade or labor segregation structure.

Revealed Comparative Advantage index(RCA) is the most widely used index to express export competitiveness of certain goods.

If a certain country export a particular product of revealed comparative advantage index to other countries some extent

large volume product rather than other countries, it is based on assumption that this country has export competitiveness.

RCA index has merit to compare competitiveness between countries that have different economic scale easily.

If RCA index is bigger than 1, it means this product has comparative advantage rather than other products in his own country.

Revealed Comparative Advantage(RCA) index suggested by Balassa(1970), Kojima(1970) can be calculated as following formular.

$$\text{<Formular> } RCA_i = \frac{EX_i/WEX_i}{TEX/TWEX} \times 100$$

$EX_i$  : i industry's export amount from a certain country.

$WEX_i$  : i industry's export amount against world market.

$TEX$  : a certain country's total export amount.

$TWEX$  : export amount of total products against world.

In case RCA index is smaller than 1, it means this product has comparative disadvantage rather than other products in his own country.

At first, RCA index is suggested as alternative comparative advantage calculation method under the realistic condition of availability to get relative production cost or relative price data.

Consequently, it is used comprehensive indicator of comparative advantage possibility according to relative price shift caused by technical factors, factor endowments difference as it shows comparative accomplishments without attributable to a particular theory of comparative advantage as well as including market share coming from economic scale and possibility of trade shift.

By using above 3 comparative index of competitiveness, let me analyze competitiveness of Korea-Sino car industry at next chapter.

#### 4.2. Revealed Comparative Advantage Index for Korea-China Car Industry

.Now, specifically, you can calculate RCA index for Korea-China Car Industry as follows;

<Table 8> Korean car export amount against China

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	Rep. of Korea	China	87	\$167,271,560
2005	Export	Rep. of Korea	China	87	\$3,222,042,050
2012	Export	Rep. of Korea	China	87	\$5,654,131,447

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 9&gt; Car export amount toward world market

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	world	world	87	\$6,338,632,926,696
2005	Export	world	world	87	\$10,361,240,970,216
2012	Export	world	world	87	\$17,278,696,232,753

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 10&gt; Korean total export amount against China

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	Rep. of Korea	China	TOTAL	\$18,454,539,579
2005	Export	Rep. of Korea	China	TOTAL	\$61,914,973,037
2012	Export	Rep. of Korea	China	TOTAL	\$100,023,688,501

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 11&gt; All products export amount against world market

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	world	world	total	\$6,338,632,926,696
2005	Export	world	world	total	\$10,361,240,970,216
2012	Export	world	world	total	\$17,278,696,232,753

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 12&gt; RCA index for Korea-China car industry

2000	2.63892	0.002911438	0.009063979
2005	0.000310971	0.005975633	0.052039788
2012	0.000327231	0.005788845	0.056527924

Source : Author calculated it based on UN Comtrade data(2012).

Per <Table 12>, RCA index is 0.009 in 2000. As that is significantly shorter than 1, Korean car industry is considerably comparative disadvantage with China compared to other industries. RCA index is 0.052 in 2005 which means it is much smaller than 1, but, it is pretty much improved rather than 2000 as well as comparative disadvantage against China is also pretty much improved compared to other industries.

RCA index is 0.056 in 2012 which is much smaller than 1 and Korean car industry continues comparative disadvantage against China since 2005 compared to other industries. However, it indicates it is improving little by little.

#### 4.3. Trade specialization index for Korea-China Car Industry

Per <Table 15>, TSI is 0.447 in 2000, 0.838 in 2005 and 0.624 in 2012 respectively that the index is closer into +1 since 2000 and it is a little bit far away from +1 in 2012. As TSI is between maximum value +1 and minimum value -1, if mentioned index is bigger, it means the competitiveness is strong. If it is 0, export amount equals to import amount. In case it comes closer into -1, it means degree of import specialization is high and if it comes closer into +1, it means degree of export specialization is high. Therefore, Korea is comparative ad-

vantage of export specialization and China is comparative advantage of import specialization.

&lt;Table 13&gt; Korean car export amount against China

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	Rep. of Korea	China	87	\$167,271,560
2005	Export	Rep. of Korea	China	87	\$3,222,042,050
2012	Export	Rep. of Korea	China	87	\$5,654,131,447

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 14&gt; China car export amount against Korea

Period	Trade Flow	Reporter	Partner	Code	Trade Value
2000	Export	China	Rep. of Korea	87	\$63,870,642
2005	Export	China	Rep. of Korea	87	\$282,440,384
2012	Export	China	Rep. of Korea	87	\$1,305,796,732

Source : Author calculated it based on UN Comtrade data(2012).

&lt;Table 15&gt; Trade specialization index for Korea against China

2000	\$103,400,918	\$231,142,202	+0.447347638
2005	\$2,939,601,666	\$3,504,482,434	+0.838811928
2012	\$4,348,334,715	\$6,959,928,179	+0.624767182

Source : Author calculated it based on UN Comtrade data(2012).

#### 4.4. Trade intensity index for Korea-China car industry

According to traditional trade theories, they assume that international trade is done between 2 countries and inevitably existing geographical and institutional barriers such as transportation cost, customs duty does not exist. Under these assumption, international trade is decided through price discrepancy. Traditional theories explain reason of this price discrepancy is difference of each country's production condition. However, real life that lots of countries are existing has factors(transportation cost, customs duty) that affect price as well as non-price factors(cultural homogeneity and historical background) that also affect trade flow.

Thus, trade flow of real life is affected by non-comparative advantage factors. It is trade intensity analysis to explain trade flow under lots of countries are existing. Trade intensity analysis has assumption that trade flow is affected by both each country's comparative advantage structure and non-comparative advantage factor. Therefore, trade flow's decisive factor is explained by comparing both ex-ante total import & export volume and ex-post total import & export volume. Namely, trade intensity analysis is analysis for bilateral trade flow by contrasting ratio between domestic country and partner in the world trade, shift between partner's import product's structure and domestic export product's structure.

Per <Table 20>, 3.099 in 2000 means export ratio of Korea

against China is significantly higher. 3.487 in 2005 and 1.733 in 2012 show that export ratio of Korea against China is increased until 2005 and then, its export ratio is decreasing with a large extent.

Per <Table 21>, 0.107 in 2000, 0.217 in 2005 and 0.180 in 2012 indicate Korea's share against China market in each year. 0.034 in 2000, 0.062 in 2005 and 0.103 in 2012 show Korea's share against world market. In other words, this index calls comparative market intensity degree which means Korea's world market share against China market share.

<Table 16> Korean export amount against China

2000	\$18,454,539,579
2005	\$61,914,973,037
2012	\$100,023,688,501

<Table 17> Korean total export amount

2000	\$172,267,495,379
2005	\$284,418,167,174
2011	\$555,208,897,965

Source : Author calculated it based on UN Comtrade data(2012).

<Table 18> Chinese total import amount

2000	\$225,093,731,030
2005	\$659,952,762,119
2012	\$1,818,199,227,571

<Table 19> World total import amount=World total export amount

2000	\$6,513,243,011,103
2005	\$10,573,099,053,017
2012	\$17,497,143,917,260

Source : Author calculated it based on UN Comtrade data(2012).

<Table 20> Trade intensity index between Korea & China--formular (1)

2000	0.081986022	0.026448805	3.099800595
2005	0.09381728	0.02690017	3.48760912
2012	0.055012502	0.031731401	1.73369279

Source : Author calculated it based on UN Comtrade data(2012).

<Table 21> Trade intensity index for Korea against China--formular (1)

2000	0.10712723	0.034559394	3.099800595
2005	0.217689938	0.062418101	3.48760912
2012	0.180155053	0.103914058	1.73369279

Source : Author calculated it based on UN Comtrade data(2012).

## 5. Conclusion

This study empirically analyze how Korea-Sino trade dependent relationship is shifted during over 10 years trade intensity index, trade specialization index and revealed comparative advantage index. By this, we can review import & export structural factor of 2 countries. Let me summarize results from empirical analysis as follows;

First, regarding to trade intensity of Korea-Sino car industry in 2000, Korea's export ratio against China is significantly high. In 2005 and 2012, Korea's export ratio against China is going up sharply and then, it is diminishing gradually.

Second, Per trade specialization index(TSI) for Korea-China Car Industry, the index shows that it is closer into +1 since 2000 and it is a little bit far away from +1 in 2012. As TSI is between maximum value +1 and minimum value -1, if mentioned index is bigger, it means the competitiveness is strong. If it is 0, export amount equals to import amount. In case it comes closer into -1, it means degree of import specialization is high and if it comes closer into +1, it means degree of export specialization is high. Therefore, Korea is comparative advantage of export specialization and China is comparative advantage of import specialization.

Third, regarding to RCA index, is 0.009 in 2000. As that is significantly shorter than 1, Korean car industry is considerably comparative disadvantage with China compared to other industries. During 2005~2012, RCA index shows it is pretty much improved rather than 2000, however, it is still smaller than 1 means that Korea is comparative disadvantage against China compared to other industries. In reality, as Korea is severely comparative disadvantage with China in car industry based on Trade Intensity Index and Revealed Comparative Advantage Index, it seems that this kind of business should transfer their business into China to get profitability of enterprise.

This research conducted by 3 theories, of which Trade Intensity Index and Revealed Comparative Advantage Index resulted in same conclusions. However, Trade Specialization Index did not conduct practical verification clearly which is this paper's limitation. Therefore, mentioned limitation should be overcome through inter-industry trade index in the future research.

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