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 the Northwest coast of the Pacific Ocean, in case economic cooperation is intensified, transportation and communication costs 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
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 oversee 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 normally 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 1 US market without any big differences against their car grade.
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.

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-
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 80,685 261,953 2,960,186
2006 China Car 87 362,232 3,153,018 114,867 457,329 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 1,665,251,840,733 32,692,294

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 overseas 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.
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, formula<1> can be changed into formula<1’> as follows

\[ I_{ij} = \frac{X_{ij}/X_{iw}}{(X_{i}/M_{iw})} \]

\[ I_{ij} = \text{I country’s trade intensity against j country} \]

\[ X_{iw} = \text{I country’s total export} \]

\[ M_{iw} = \text{j country’s total import} \]

\[ M_{iw} = \text{World total import (= Total export)} \]

numerator of formula(1’) shows I country’s share against j country’s market and denominator of formula(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.

\[ <\text{Formula}> \quad \text{TSI} = \frac{X_i - M_i}{X_i + M_i} \]

\( (X_i : \text{Export of certain industry, } M_i : \text{Import of certain industry}) \)

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 comparision 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.

\[ <\text{Formula}> \quad \text{RCA} = \frac{EX_i/WEX_i}{TEX/TWEX} \times 100 \]

\( (EX_i : \text{i industry’s export amount from a certain country.} \)

\( WEX_i : \text{i industry’s export amount against world market.} \)

\( TEX : \text{a certain country’s total export amount.} \)

\( TWEX : \text{export amount of total products against world.} \)

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;

| 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).
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 that 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 o, 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 adv-

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     | <Table 17> Korean total export amount       |
|--------------------------------------------------|--------------------------------------------|
| 2000 $18,454,539,579                            | 2000 $172,267,495,379                      |
| 2005 $61,914,973,037                            | 2005 $284,418,167,174                      |
| 2012 $100,023,688,501                           | 2011 $555,208,897,965                      |

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

| <Table 18> Chinese total import amount          | <Table 19> World total import amount       |
|------------------------------------------------|--------------------------------------------|
| 2000 $225,093,731,030                           | 2000 $6,513,243,011,103                    |
| 2005 $659,962,762,119                           | 2005 $10,573,099,053,017                   |
| 2012 $1,818,199,227,571                         | 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 0.081986002                                                   | 2000 0.026448805 3.099800595                      |
| 2005 0.09381728                                                    | 2005 0.02690017 3.48760912                         |
| 2012 0.055012502                                                   | 2012 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 0.1071273                                                   | 2000 0.034559394 3.099800595                      |
| 2005 0.217689938                                                | 2005 0.062418101 3.48760912                         |
| 2012 0.180155053                                                | 2012 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 much 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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