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A Study of the Impacts on Electronic Distribution Industry after Korea-China FTA

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Abstract

Purpose - This study attempted to discover the impact of the Korea-China FTA (Free Trade Agreement) on electronic products distribution industry. Strategies will be provided to expand both countries' trade after the Korea-China FTA.

Research design, data, and methodology - This study analyzed the differences before and after the Korea-China FTA, using an RCA (Revealed Comparative Advantage) index, TC (Technology Sophistication Index) index and TSI (Trade Specialization Index) that considered the FTA tariff situation. Data was collected from the International Trade Statistics Database and Korea, China Customs Service.

Results - The results indicate that following the Korea-China FTA, China and Korea's bilateral trade of electronic products is expected to expand, and both countries will experience net welfare gains from the markets' expansion. Korea is competitive in several key products, although it faces competition from China. China's electronic products' competitiveness have indicated an increasing trend.

Conclusions - The two countries should closely cooperate and communicate with each other. Ultimately, Korea should focus on high-tech, sophisticated techniques to gain market advantage. On the other hand, with the tariff decrease as well as the labor cost and labor force base, China will greatly be able to benefit from the manufacturing of medium- to low-end products in the future.

Keywords: Korea-China FTA, Competitive Advantage, Electronic Products, Distribution Industry, Export Strategy.

JEL Classifications: F15, F53.

1. Introduction

The current international economic trend can be characterized as that of pursuing globalization. All countries are expanding their trade volume for this objective, especially by increasing their regional economic systems and internal scale. Each country in this situation can enjoy substantial economic benefits after joining an economically integrated organization.

We can observe in the European Union (EU), the North American Free Trade Agreement (NAFTA), and the Association of Southeast Asian Nations (ASEAN) that economic integration has occurred on behalf of regional and

domestic economic groups on economic interchanges. Therefore, establishing free trade areas has become an essential element that cannot be foregone in member countries.

South Korea and China established a diplomatic relationship under this background in 1992. Afterward, both countries experienced tremendous economic growth. China in particular became South Korea's biggest trading partner, export market, and object of investment. Conversely, South Korea also became China's third-largest trading partner. This situation promoted not only historical and geographical elements, but also real, mutual benefits for the two countries. Furthermore, China and South Korea have a strong trading relationship in the electronic products industry. Additionally, geographical proximity and similar cultures have also developed the electronic trade between the two countries.

Korea and China began business trading with each other in 1992 under a diplomatic relationship. However, China's politics and social situation did not simultaneously match that

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of Korea, and trade amounts were limited. Recently, China has rapidly developed its economy, and has gained abilities and significant market resources that can match Korea's economic level. As a result, a Korea-China free-trade agreement (FTA) was implemented on June 1, 2015 and came into effect superficially on December 20, 2015, highlighting both countries' advantages rather than its disadvantages. China had a favorable labor force, lower labor costs, and price competitiveness, while Korea owned capital, technology, high-value products, and machinery equipment.

From the total import and export between the two countries, the total trade volume of electronic products take the largest share in 2016. Korea's electronic products exports to China accounted for 39.7% of total exports as well as China's electronic products exports which accounted for 45.7% of total exports. For both China and Korea, electronic products are one of the main driving forces of economic development between the two countries. Also the trade of electronic products can be consider as the bridge between the two countries' economic cooperation. Therefore, facing the changes of Korea-China FTA, researches on electronic trade under Korea-China FTA are essential.

Most of the previous research focused on the macroeconomic of Korea and China and predict the expected effects of Korea-China FTA. Because Korea-China FTA implemented on 2015, they don't have enough evidence and actual trade data to prove their finding.

Under this background, This study was trying to analyze what kind of impacts will have to the trade of electronic products with Korea-China FTA and what kind of strategies or policies should be made following the impacts of Korea-China FTA.

2. Literature Review

In this study, we compare Korea and China's electronic products trade after the Korea-China FTA came into effect. When comparing products between countries, the International Competitiveness is always chosen as the first indicator.

The classical economist Adam Smith in 1776 argued that the strength of international competitiveness depends primarily on the factors of production in a country or region - specifically, the comparative advantage of labor, capital, and natural resources. Countries or regions with advantages in labor, capital, and natural resources have more competitiveness than other countries or regions with less of these factors of production.

Porter's (1990) Diamond Theory of National Advantage Model claimed that traditional trade theory based on comparative advantage cannot explain the trade patterns of countries with low resources, such as Japan. Most traditional

theories of global economics mention elements or factors that a country or region inherently possesses, such as land, location, natural resources, labor, and population size as the primary determinants in a country's comparative economic advantage. Porter's Diamond Theory suggests that countries can create new factor advantages for themselves, such as a strong technology industry, skilled labor, and government support of a country's economy. In essence, this model shows how to maintain the international competitiveness of the industry where each factor is in place.

Yun (2011) defined international competitiveness as a certain level of 'ability' or 'power' with which an economic entity in a country can compete in the world market with companies, industries, and countries for market share. The fact that a country has international competitiveness in the world market implies that it has an internationally competitive industry, and therefore that each individual company in the industry is internationally competitive.

Kim (2011) stated that the concept of international competitiveness becomes more important as the trade imbalance between countries deepens and trade friction becomes more serious. As the government's policy efforts have been emphasized in order to secure the comparative advantage of its products in the global market, it is being discussed more seriously. Dunning (1981) integrated theories that have evolved individually to comprehensively account for all the advantages of multinational corporations. He did not address the importance of international competitiveness in relation to the stages of national development, although he did explain the types of investment changes that a country may experience as it moves from one stage of development to the next.

Buckley and Casson (1991) discussed the evolving role of certain elements in determining the success of multinational corporations entering overseas markets, but their discussion was limited to the issues of geography and business environment. An FTA is a contractual agreement between two or more parties, under which they give each other preferential market access, or a free-trade area where a designated group of countries has agreed to eliminate tariffs, quotas, and preferences on most goods between them. According to conventional trade theory, free trade is for the mutual benefit of all trading partners. As trade can relieve local shortages and act as a catalyst for growth, free trade enables the world to maximize gross material efficiency and total output.

Cin (2012) used the GTAP-CGE simulation to analyze the macroeconomic and industrial effects of the Korea-China FTA. The results revealed that under an assumption of full elimination of tariffs in all manufacturing sectors except service industries, Korea's real GDP would increase by 0.26 to 0.91% due to the Korea-China FTA.

Kim and Shikher (2015) used a 53-country, 15-industry computable general equilibrium model of trade to analyze the Korea-China free trade agreement's effects on the

Korean economy. The model predicts that the Korea-China FTA will increase Korea-China business trade by 56%. The FTA between Korea and China can furthermore significantly impact the Korean economy because of the close economic relationship between the two countries.

On the other hand, Chinese scholars have also engaged in active research on the Korea-China FTA. Yang and Lan (2014) analyzed the economic trade situation and TI index between Korea and China. The results showed that Korea's GDP is expected to increase 2.24% to 3.29% more than China's with the signing of the FTA. However, regarding the entire FTA region and in terms of static or dynamic perspectives, the Korea-China FTA will improve both countries' economies.

Wei and Li (2012) used SPSS statistical software to analyze the increasing effects of trade cooperation between Korea and China. Hua and Cao (2011) also used GTAP's gravity model to analyze the trade effects between Korea and China. They found that based on the tariff rate revocation, an increasing effect on the amount of commodity trading occurred after the Korea-China FTA. Xue and Zhang (2014) chose different methods to compare the GTAP's model to research East Asian trade cooperation. They indicated that if the Korea-China FTA came into effect, a trade creation effect would be achieved by eliminating tariffs and trade barriers. Actual GDP growth would be more than 7.6% for both countries.

<Table 1> Summary of the Main Findings of Previous Researches.

Scholar	Research Method	Main Findings
Hua & Cao (2011)	GTAP	Based on the tariff rate revocation, increasing effect on commodity trading after Korea-China FTA
Cin (2012)	GTAP	Korea's real GDP would increase by 0.26 to 0.91%.
Wei & Li (2012)	Economic trade statics	Increasing effects of trade cooperation between Korea and China
Xue & Zhang (2014)	GTAP	GDP growth would be more than 7.6% for both countries.
Yang & Lan (2014)	Economic trade statics	Korea's GDP is expected to increase from 2.24% to 3.29% more than China.
Kim & Shikher (2015)	CGE	The model predicts the Korea-China FTA will increase business trade by 56%.

3. Methodology

3.1. Data Classification

In this study, We collected main trading household electronic products. Data are classified using the Harmonized

System Codes 2017 as set by the UN Comtrade. Considering the difference between household appliances and industrial appliances, most products are classified by Harmonized System Codes 4 units and others with Harmonized System Codes 6 units.

<Table 2> Data Classification.

HS CODE	Items
8525	Radio and TV transmitters, television cameras.
8415	Air conditioning equipment, machinery.
8418	Refrigerators, freezers and heat pumps.
8450	Household, laundry-type washing machine.
841451	Table, window, ceiling fans, electric motor.
850811	Vacuum cleaners.

Source: UN Comtrade (2017).

3.2. Revealed Comparative Advantage

Measures of revealed comparative advantage (RCA) have been used to assess a country's export potential. The RCA indicates whether a country is extending the products in which it has trade potential, as opposed to situations with a static number of products that can be competitively exported. This can also provide useful information regarding potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless intra-industry trade is involved. If RCA measures are estimated with high levels of product disaggregation, a country can focus on other nontraditional products that might be successfully exported. The RCA index of country i for product j is often measured by the product's share in the country's exports, relative to its share in global trade; this most commonly refers to an index introduced by Bela Balassa (1436). RCA formula can be expressed as follows:

$$RCA_{ij} = \frac{X_{ij} / X}{X_{wj} / X_w}$$

Here X_{ij} and X_{wj} are the values of country i 's exports of product j and world exports of product j , and where X and X_w refer to the country's total exports and world total exports, respectively. Specifically, the RCA is equal to the proportion of the country's exports that are of the class under consideration (X_{ij} / X), divided by the proportion of world exports that are of that class (X_{wj} / X_w).

Export value are collected from UN Comtrade Database (<https://comtrade.un.org/data/>). For RCA, the study collected the exports value in 2015 and 2016 for above productions both in Korea and China. Also the world exports value of each products and the world total exports.

3.3. Technology Sophistication Index

At present, the international division of labor is deepening, while bilateral trade analysis cannot be satisfied with the comparison of imports and exports of trade products and the proportion of this ketone trade structure classification analysis, therefore making it necessary to analyze the technical structure of trade products. Lall (2005) used the Technology Sophistication Index to calculate the technical content of different products. In this study, the Technology Sophistication Index is used to analyze the export structure of China and Korea's electronic products. The technical content of the product is defined in Formula (2).

$$TC_1 = \sum_{i=1}^n w_i^k \ln(Y^k)$$

Here, i represents product, k represents country, Y^k represents k country's GDP per capita, while w_i^k refers to the standardized comparative advantage of export for k country's i product. This variable is in turn defined specifically as:

$$w_i^k = \frac{RCA_i^k}{\sum_{i=1}^n RCA_i^k}$$

Here, RCA means the revealed comparative advantage of k country's i product. Obviously, $\sum_{i=1}^n w_i^k = 1$ Here the RCA is calculated as in Formula (1). Ultimately, the product Technology Sophistication Index is calculated as shown in Formula (4):

$$ETC_i^k = TC_i * \frac{X_i^k}{X^k}$$

Here, ETC_i^k represents the k country's i product's Technology Sophistication Index. X_i^k on the other hand represents the k country i product's export. X^k represents k country's total export.

The RCA of each product in each country were calculated above. For TC index, this study collected the GDP per capital for each country from National Bureau of Statistics of China(<http://www.stats.gov.cn/tjsj/ndsjs/>) and Korea Statistical Information Service (<http://kosis.kr/index/index.jsp>).

3.4. Trade Specialization Index

From the difference between exports and imports, we use the concept of net exports to demonstrate the degree of comparative advantage for specific industries in certain regions. The Trade Specialization Index indicates whether

the importer or exporter is specialized in a particular industry or commodity, and is also called the Global Competitiveness Index or Export-Import Ratio Index. The Trade Specification Index of industry i is generally defined as follows:

$$TSI = \frac{X_{ij} - M_{ij}}{X_{ij} + M_{ij}}$$

$TSI_{i,j}$ represents product j 's Trade Specialization Index for Country i ;

$X_{i,j}$ refers to the export of i country's j product; and,

$M_{i,j}$ represents the import of i country's j product.

If the index value is closer to -1 , this means that there is a higher degree of specialized imports. On the other hand, an index value closer to 1 indicates a higher degree of export specialization. We can determine through the same index the specific export or import revenue stamp specific to China and South Korea's electronics industry.

When the trade specialization index is low, we can analyze this from two perspectives. The first is the possibility of weakening competitiveness, and the other is that when promoting the trading process, the two countries' industry structures become increasingly similar.

Export and import data for each product of Korea and China are collected from UN Comtrade Database. (<https://comtrade.un.org/data/>) to calculate the TSI in 2015 and 2016.

4. Analysis Results

4.1. Revealed Comparative Advantage

The revealed comparative advantage index reflects a country's competitive global position. If the $RCA > 2.5$, this indicates that the country has a highly competitive advantage in this product; if it is between 1.25 and 2.5 ($1.25 \leq RCA \leq 2.5$), this indicates that the country's product has strong international competitiveness; if it is between 0.8 and 1.25 ($0.8 \leq RCA \leq 1.25$), this indicates that the country has moderate international competitiveness; and if the $RCA < 0.8$, this indicates that the country has weak competitiveness.

<Table 3> Revealed Comparative Advantage (RCA) of Korea and China According to Item for 2015-2016.

Item	2015		2016	
	Korea	China	Korea	China
8525	1.16	2.37	2.61	1.91
8415	1.27	2.58	1.25	2.86
8418	2.34	1.61	2.36	1.68
8450	2.80	2.45	3.13	2.46
841451	0.12	5.87	0.10	5.92
850811	0.72	4.01	0.57	3.89

Source: Calculated based on UN Comtrade database

We can observe in <Table 3> that for 2015, Korea's RCA for HS841451 (Table, window, and ceiling fans; electric motors), and HS850811 (Vacuum cleaners), are 0.121 and 0.721 respectively, which are both less than 0.8 ($RCA < 0.8$), which means Korea has weak competitiveness in this product. The RCA value for HS8525 (Radio and TV transmitters, television cameras) is 1.16, which means Korea has moderate competitiveness in this product. Simultaneously, HS8415 (Air conditioning equipment, machinery) and HS8418 (Refrigerators, freezers and heat pumps) both have an RCA value in Korea that exceeds 1.25, but are less than 2.5. This means that Korea has strong international competitiveness in these products. Finally, HS8450 (Household, laundry-type washing machine) has an RCA value of 2.805 which is greater than 2.5; this indicates that Korea has great competitive advantage in this product. On the other hand, China has a higher competitive advantage in all items except HS8418 (Refrigerators, freezers and heat pumps) and HS8450 (Household, laundry-type washing machine), and especially in HS841451 (Table, window, and ceiling fans; electric motors) and HS850811 (Vacuum cleaners).

In 2016, Korea's RCA in HS8525 (Radio and TV transmitters, television cameras) had a great improvement to 2.612 which indicates that it gained more competitiveness advantage while China's RCA in HS8525 (Radio and TV transmitters, television cameras) decreased a little bit.

The revealed comparative advantage index illustrates that Korea has a higher competitive advantage in HS8418 (Refrigerators, freezers, and heat pumps), HS8450 (Household, laundry-type washing machines, and washer-dryers). On the other hand, China has a higher competitive advantage in HS850811 (Vacuum cleaners) and especially in HS841451 (Table, window, and ceiling fans; electric motors). Korea's competitive advantage is increasing in HS8525 (Radio and TV transmitters, television cameras) and HS8450 (Household, laundry-type washing machine).

4.2. Technology Sophistication Index

<Table 4> Technology Sophistication Index of Korea and China According to Item.

Item	Korea	China
8525	5.47	3.72
8415	2.76	5.57
8418	5.31	3.35
8450	2.21	1.54
841451	0.02	1.18
850811	0.21	1.27

Source: Calculated based on UN Comtrade database

The Technology Sophistication Index show the technical container of one product, the bigger index means complex technology level while the product is made. We can observe in Table 4 that Korea and China have a significant

difference in product technical level. Korea's product technical levels for HS8525 (Radio and TV transmitters, television cameras), HS8418 (Refrigerators, freezers and heat pumps.), HS8450 (Household, laundry-type washing machine) have a greater advantage compared with China. On the other hand, China's product technical levels for HS8415 (Air conditioning equipment, machinery), HS841451 (Table, window, ceiling fans, electric motor), and HS850811 (Vacuum cleaners) are higher than those of Korea.

4.3. Trade Specialization Index

<Table 5> Trade Specialization Index of Korea and China According to Item for 2015-2016.

Item	2015		2016	
	Korea	China	Korea	China
8525	0.21	-0.81	0.58	-0.49
8415	-0.04	0.33	-0.24	0.54
8418	0.07	-0.02	-0.27	0.26
8450	0.47	-0.17	0.28	0.18
841451	-0.91	0.98	-0.97	0.94
850811	-0.86	0.87	-0.88	0.86

Source: Calculated based on UN Comtrade database

<Table 5> indicate that Korea had relatively strong competitiveness in HS8415 (Air conditioning equipment, machinery), HS8418 (Refrigerators, freezers and heat pumps) and HS8450 (Household, laundry-type washing machine) in 2015. However, all these products' competitiveness weakened in 2016 except for HS8525 (Radio and TV transmitters, television cameras) and HS8450 (Household, laundry-type washing machine). On the other hand, China's TSI index demonstrated a growth trend from 2015 to 2016.

Overall, China's rapid economic growth, industrial upgrading, and accelerating industrialization process led to China's demand for electronic products. Then, Korea as a newly industrialized country, took a significant advantage in electronic products. Electronic products exports in foreign trade occupy a huge share. Therefore, electronic products have developed as China and Korea's major trade goods. Although China's R&D capability and technical level are less than that of Korea, they can also occupy the low-end electronic market, expanding exports of electronic products by their comparative advantage.

4.4 Korea-China FTA Concessions

As we attempt to find the relationship between index exchange and the Korea-China FTA, in this section we note the tariffs of both China and Korea.

<Table 6> List of Concessions for the Korea-China FTA According to Item.

Item	Korea Concessions	China Concessions
8525	Immediate abolition (Duty - Free)	Immediate abolition (Duty - Free)
8415	Abolition in 10 years	Abolition in 10 years
8418	Abolition in 10 years	Abolition in 10 years
8450	Abolition in 10 years (under 10kg)	Abolition in 10 years
841451	Abolition in 10 years	Abolition in 10 years
850811	Abolition in 10 years	Abolition in 10 years

Source: Korea-China FTA (2015).
<http://fta.mofcom.gov.cn/topic/enkorea.shtml>

<Table 7> Tariff Rate of the Korea-China FTA

(Unit: %)

Item	2016	2017	2018	2019
8525	0	0	0	0
8415	12	10.5	9	7.5
8418	9	8.5	8	7.5
8450	8	7	6	5
841451	17.3	15.9	14.6	13.3
850811	8	7	6	5

Source: Korea-China FTA (2015).
<http://fta.mofcom.gov.cn/topic/enkorea.shtml>

<Table 6> and <Table 7> shows the projected tariff exchanges in the upcoming years. Both sides immediately abolished tariffs for HS8525 (Radio and TV transmitters, television cameras). Considering Korea and China's RCA and TSI, we can note that Korea's exports became more active in 2015 and 2016. Korea's TSI also reveals that HS8525 (Radio and TV transmitters, television cameras) is the only item that did not have a decreasing trend. This could be in part due to the abolition of tariffs, and partially because Korea continuously has high global competitiveness with its unique technology and global brand image.

From the analysis, it was found that Korean electronic products' competitiveness in China has decreased due to the concessions of the Korea-China FTA. Other items' tariffs will become zero (0) in as soon as 15 years. Although Korea is still competitive in semiconductors, liquid crystals, wireless communications, and other global products, it faces significant competition from China. Under this trend, if the two countries build the FTA to increase their bilateral trade volume and expand their economic and trade cooperation in the electronics industry, Korean products with a high intra-industry trade degree but few competitive advantages will be quickly eliminated or replaced by products from its partner, China.

Regarding China after the Korea-China FTA, under the combined effect of trade creation and expansion effects, China and Korea's bilateral trade of electronic products is expected to further expand. Both countries will experience

net welfare gains from the markets' expansion. However, China's total bilateral trade in electronics still has relatively weak competitiveness, while the overall tariffs on electronics is higher than in Korea.

According to repositioning requirements of the Korean electronic industrial, economic, and trade cooperation, and the economic and trade environment changes after the establishment of the Korea-China FTA, this study discusses the economic and trade cooperation status and the prospective changes following the FTA's establishment. The next section primarily explores countermeasures for both countries' electronic industries.

5. Discussion and Conclusions

In the section, consider the result form above, countermeasures and suggestions for both countries are proposed.

5.1. Expand China's Domestic Market

China's domestic electronics industrial policies have experienced dramatic changes. Under these conditions, to maximize the benefits of the Korea-China FTA, Korea's electronics industry should attempt to expand China's domestic market. Until recently, the cooperation between the two sides was still concentrated on processing and production, for two major reasons. First, the Chinese government provides more favorable terms for processing cooperation. Second, China's domestic market has not yet matured. However, new policies in China represented by the "Eleventh Five-Year Plan" have made it difficult for processing cooperation to continue obtaining support at its current level. Moreover, China's domestic market is also gradually developing, and to deepen this domestic market's expansion, Korea's electronics industry must adopt the following localized R&D strategies: First, Korean electronics enterprises should establish local R&D, production, and sales departments to develop and manufacture products based on local consumers' demands. Second, with a thorough understanding of Chinese culture, Korean electronics enterprises should implement emotional marketing strategies effective among Chinese consumers. Third, by maintaining a friendly relationship with Chinese society, Korean electronics enterprises can minimize their local operations risks and avoid arousing opposition from local governments or enterprises.

5.2. Optimize the Structure of Korea's Electronics Industry

Section 4 discusses the characteristics of the electronics product trade between China and Korea, in which it is

mentioned that the TSI of Korean products competitive in China is decreasing in China. This means that China becomes increasingly competitive in terms of the product's trade. Under the previous electronic competition structure, the global development new products and high-tech products will provide substantial profits and contributions. Therefore, the Korean government and its enterprises should implement a product strategy involving both "selection and concentration." Under the new environment both competing and cooperating with China, the previous strategies can seldom provide the same contributions to Korea's electronics industry. Faced with a new environment, Korea's electronic enterprises should adopt the following new strategies. Generally, high-end products' added value is greater than that of low-end products. Therefore, Korea's electronics industry should adopt performance optimization strategies in the high-end finished product market, and provide parts for the medium-end and low-end finished product markets.

5.3. Enhance Complementary Cooperation

China and Korea have different resource endowments and competitive advantages, and the FTA may not provide mutual benefits. Korea's electronics industry should enhance complementary cooperation with its Chinese counterpart. First, the Chinese government's new policies, as represented by the information industry's "Eleventh Five-Year Plan" are encouraging the acquisition of "market shares with techniques;" therefore, Korea's electronics industry should actively pursue this policy direction to increase its market shares. It should be noted that the provision of techniques might create future competitors. Therefore, techniques should be selectively provided according to their importance and influence. In a high-level, intra-industry trade structure, the two countries can enhance their competitiveness through improving their product differentiation. As the two countries' electronic trade has entered an intra-industry trade period, the chance of unnecessary competition is high. Therefore, price competition can be avoided to the greatest extent through product differentiation, thus improving the two countries' social welfare and developing their competitiveness in the international arena.

A full plan regarding structural differences should be created to obtain the competitive products that suit each country's characteristics. As a result, Korea should focus on high-tech, sophisticated techniques to gain a market advantage over China's low labor costs and substantial labor force. Decreases in tariffs will cause China's products to be cheaper than before to export. Considering the labor costs and labor force base, China would benefit in manufacturing medium-end and low-end products.

This paper use the import, export data from Korea and China which before and after the FTA comes into effect. Comparing with the previous researches, the changes on the trade of electronic products is more obvious than prediction.

This study also consider the industrial structure for both countries including the technical differences. But only focus on the current situation is not enough, the total impact of Korea-China FTA needs to be better analysis in a long term and periodic perspective in the future researches.

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