Analysis of International Competitiveness in the Aircraft Industry

Jae-Sung Lee

Professor, Department of Trade, Dongeui University, Busan, Korea
E-mail: jslee7@deu.ac.kr

Abstract

Purpose – The main target to do this analysis is to find out the competitiveness between 2 countries (China and USA) in the aircraft business industry. The main target about mentioned research is to find out how a certain country takes more advantage against the other partner country in the country's trade structure.

Research design, data, and methodology – Mentioned research period ranges from 1995 to 2016. Research basic data are coming from UN COMTRADE database which is top of top in the world statistical data and Research methods are used 3 types of international trade related theory for credible data outcomes.

Results – Even though general data about aircraft industry are open to world society, detailed classified data are not easy to get them. Generally, Both China & USA are not easy to obtain data especially, in the overseas production field as a business secret which is one of research limitation in every research scopes.

Conclusions – Even though Chinese aircraft industry looks like strong and more advantage against those of other countries based on competitive labor work wages and low price of raw material and resources, Actually, USA has overwhelmingly dominant advantage against that of China in the field of aircraft industry because USA has abundant capitals and up-to-date advanced high-technology as top of world economic communities. Additionally, even if USA aircraft industries hold a dominant position so far, if USA proposes sound competition relationship with China about aircraft industry, both 2 countries' future will be bright as their cooperation will make synergy effects for mutual benefits under current circumstances in 2 countries.

Keywords: Aircraft Industry, Market Share, Trade Structure

JEL Classification Code: F14, F17, L62, L92.

1. Introduction

In March 2016, China aviation engine group (AAEC) was established with total asset approximately 26.1 trillion won, which is the world top position, the largest scale as aviation engine company. World aviation industry closely pays attention to AAEC's movement. China has been making every efforts for their self-engine developments. In fact, C919 and ARJ21 is not genuine made-in-China as localization ratio is below behind 50%. Most of all, core components are dependent to USA and European companies. The engine which is the most important one is turbo engine made by joint venture companies between USA GE and French CFM. Aviation control system and aviation recording system are made by GE. 17 foreign companies attended to supply core components. Basically, China tried to equip their own developed engine, but, they realized technology limitation to change global cooperation systems.

In case engine and core components are not domestic localization, China will face continuous growth limitation. One of economic daily newspaper says "In the past years, if a certain one company starts to develop aircraft airframe, engine development is also started accordingly. During the process, if aircraft airframe production is cancelled, which leads engine development blank also. Vicious circle is repeated instead of technology accumulation. Chinese government would like to overcome these problems to make AAEC focus R&D capabilities to boost technical skills. Chinese government is going to invest approximately 10.08 trillion won for R&D project such as engine, materials, components and test equipments in the coming 20 years.

Furthermore, China has plan to construct massive scale aviation infrastructure with investment of approximately 13.86trillion won such as 11 new airports are constructed and 52 airports are expanded in Beijing, Cheongdu, Jingdao, Siamung and Dailian, etc. China is to give its nascent airline industry a boost by allowing more domestic carriers to operate as well as allowing greater access to Chinese-foreign joint ventures according to officials. General Administration of Civil Aviation of China (CAAC) will increasingly liberalise the market in order to attract new investment to keep pace with the high levels of demand. A focus on freight, rather than passengers, is being encouraged. The encouragement of airlines will be combined with the upgrading of airports in western China which will become regional aviation centres. Routes between China to the Caribbean, western Asia, the Middle East and Africa as well as to eastern United States will be established.

Luxembourg air cargo carrier Cargolux has added new China gateways in Beijing and Xiamen, following increased demand. This is in addition to daily flights to Shanghai which have been operational since 1999. The new China service will be operated on a twice weekly basis, starting on January 9th, 2006.

Commodities on this new service will mostly consist of clothing, machinery, computers and computer parts, as well as electrical and consumer goods. Cargolux, based in Luxembourg, is Europe's largest all-cargo airline, operating a fleet of 14 B747-400 freighters on a worldwide network, covering over 90 destinations, 50 of which are served on scheduled all-cargo flights.

2. The Major Trading Partner in Export & Import overview

When we evaluate statistical data about <Table 1> to <Table 4>, we can understand Chinese export amount to USA are 8digit figure until 2000 and is increased 9 digit figure till 2010 and finally, it is increased 10 digit figure in2016, on the contrary, USA export amount to China starts 10 digit figure and finally, it is increased 11digit figure in 2016.

Table 1: Chinese Aircraft Export Amount to USA

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	USA	88	$25,737,458
2000	Export	China	USA	88	$88,828,317
2005	Export	China	USA	88	$108,547,560
2010	Export	China	USA	88	$419,225,217
2016	Export	China	USA	88	$1,112,151,862

Source: calculated by author based on UN COMTRADE database

Table 2: USA Aircraft Export Amount to China

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	USA	China	88	$1,175,756,032
2000	Export	USA	China	88	$1,691,933,684
2005	Export	USA	China	88	$3,790,395,343
2010	Export	USA	China	88	$5,762,796,389
2016	Export	USA	China	88	$14,577,299,108

Source: calculated by author based on UN COMTRADE database

Table 3: Chinese Aircraft Export Amount to World

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	World	88	$144,415,871
2000	Export	China	World	88	$535,736,955
2005	Export	China	World	88	$745,972,370
2010	Export	China	World	88	$1,265,231,817
2016	Export	China	World	88	$3,364,512,155

Source: calculated by author based on UN COMTRADE database

Table 4: USA Aircraft Export Amount to World

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	USA	World	88	$25,630,603,264
2000	Export	USA	World	88	$41,044,092,019
2005	Export	USA	World	88	$63,500,882,031
2010	Export	USA	World	88	$79,617,922,992
2016	Export	USA	World	88	$134,769,837,356

Source: calculated by author based on UN COMTRADE database

Meanwhile, Chinese export amount to world are 9digit figure until 2005 and is increased 10 digit figure from 2010 till 2016. On the contrary, in USA case, it starts 11 digit figure in 1995 till 2010 and finally, it is increased 12 digit figure. Under above statistic data outcomes, we can assume that USA aircraft industry is overwhelmingly taking dominant position against Chinese aircraft industry.

3. Structural analysis of aircraft industry between China-USA

3.1. RCA analysis Index for China-USA Aircraft Industry

We can analyze RCA research index between China-USA Aircraft Industry as follows;

Table 5: Chinese Aircraft Export Amount to USA

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	USA	88	$25,737,458
2000	Export	China	USA	88	$88,828,317
2005	Export	China	USA	88	$108,547,560
2010	Export	China	USA	88	$419,225,217
2016	Export	China	USA	88	$1,112,151,862

Source: calculated by author based on UN COMTRADE database

Table 6: World Total Aircraft Export Amount

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	World	World	88	69,402,848,062
2000	Export	World	World	88	110,669,154,649
2005	Export	World	World	88	153,597,556,514
2010	Export	World	World	88	223,101,889,528
2016	Export	World	World	88	332,538,769,993

Source: calculated by author based on UN COMTRADE database

Table 7: Chinese Total Export Amount to USA

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	USA	TOTAL	$24,728,628,807
2000	Export	China	USA	TOTAL	$52,156,428,118
2005	Export	China	USA	TOTAL	$163,180,459,034
2010	Export	China	USA	TOTAL	$283,780,322,735
2016	Export	China	USA	TOTAL	$385,677,759,424

Source: calculated by author based on UN COMTRADE database

Table 8: World Total Commodity Export Amount

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	World	World	Total	4,683,009,882,746
2000	Export	World	World	Total	6,280,112,853,131
2005	Export	World	World	Total	10,150,157,059,117
2010	Export	World	World	Total	15,031,815,870,873
2016	Export	World	World	Total	15,571,194,425,830

Source: calculated by author based on UN COMTRADE database

Table 9: RCA Index on Aircraft Industry between China-USA

Year	① Chinese aircraft Export against USA/World Total Aircraft Export	② Chinese Total Export against USA/World Total Commodity Export	RCA(= ①/②)
1995	0.00037084152	0.00528049896	0.07022849977
2000	0.00080264747	0.00830501447	0.09664612541
2005	0.00070670109	0.01607664375	0.04395824782
2010	0.00187907515	0.01887864548	0.09953442645
2016	0.00334442766	0.02476866892	0.13502653981

Source: calculated by author based on UN COMTRADE database

Based on above analysis outcome, in case aircraft industry's RCA index is bigger than 1, the aircraft industry has superior advantage rather other industries or if the aircraft industry is smaller than 1, it has low advantage against other industries. Therefore, in case we evaluate the calculated RCA index of 1995 is 0.0702 which means that Chinese aircraft industry has comparative low advantage rather than other industries in USA. Furthermore, the RCA index of 2000 is 0.0966 which means the index figure was very small quantity advanced. But, those are far below from +1 and even in 2005, the index was downward as 0.0439 compared to that of 2000. However, from 2010 and 2016, the RCA degree upward to 0.0995 and 0.1350 each respectively, which were getting improved gradually. The RCA index value is still far from +1. Therefore, we can come to conclusion that during whole research period from 1995 and 2016, Chinese aircraft industry has deeply non-competitiveness against USA industry. On the contrary, from 2010, Chinese aircraft industry was tried to improve continuously even though figure index are pretty much trivial quantity. We can speculate why competitiveness of Chinese aircraft industry is getting stronger than ever since 2010. When we can assume various reasons, the most important factor is manufacturing environment in China is getting better such as transfer to China about advanced developed country's up-to-date technology and know-how including comparative advantage low-labor cost against that of USA labor cost. Eventually, those are main reasons that Chinese aircraft industry is moving forward. However, in the view of present situation, Chinese aircraft industry does not have competitiveness at all against USA aircraft industry during whole research period (1995~2016).

That means US aircraft industry has been dominating world community as a top position since world war based on tremendous capital resources and sophisticated and advanced high-technology and know-how.

3.2. Trade Specialization Index for China-USA aircraft Industry

Generally, when we conduct research, we must take advantage of import amount in terms of trade statistics. However, it is impossible to use import amount because import amount contains import tax. That's why we would like to adopt export amount instead of import volume in order to protect false data outcome.

By reviewing <Table 10> and <Table 11>, USA aircraft export volumes against China are overwhelmingly larger than those of China throughout whole research period from 1995 to 2016(1995, 2000, 2005, 2010, and 2016) with 10 digit figures, even in 2016, the figure of export amount is 11 digit figure. On the other hand, China aircraft export volume to USA is only 8 digit or 9 digit figures which are pretty much less aircraft export volume than those of USA volume even though China's aircraft export volume to USA are increased as US$1,112,151,862 in 2016. Those export volume are still far behind those of USA.

Regarding to index of trade specialization at <Table 12>, during whole research period from 1995 to 2016, China's TSI are much closer to figure –1 which means China's aircraft industry is not export advantage as export specialization is very low while import specialization degree is high. However, when we review figures at Table data, the TSI is getting to try to approach degree 0 which means from 2010, China's aircraft industry has been increasing aircraft export to USA continuously even though those figure are still very trivial.

On the one hand, in case we evaluate USA trade specialization index in <Table 13>, USA TSI are as 0.9571 in 1995, 0.9002 in 2000 and 0.9443 in 2005, 0.8643 in 2010 and 0.8582 in 2016. During the whole research period, from 1995 to 2016, all figure digits are much closer to +1 degree representing plus (+) marks. That means that USA aircraft industry has overwhelmingly export specialization against that of China even though degree of trade specialization are little bit down from 2010 as 0.8643 and 0.8582 in 2016. Those figures are still much stronger between –1 and +1.

Finally, we can conclude that USA in aircraft industry has advantage for export specialization, while China in aircraft industry has superior advantage for import specialization according to research analytical data on <Table 12> and <Table 13>.

Table 10: Chinese Aircraft Export Amount to USA

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	USA	88	$25,737,458
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Table 11: USA Aircraft Export Amount to China

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Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	USA	China	88	$1,175,756,032
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2016	Export	USA	China	88	$14,577,299,108

Source: calculated by author based on UN COMTRADE database

Table 12: China Specialization Index to USA

Year	① China Aircraft Export Amount to USA - USA Aircraft Export Amount to China	② China Aircraft Export Amount to USA + USA Aircraft Export Amount to China	TSI(= ①/②)
1995	-1,150,018,574	1,201,493,490	-0.9571575573
2000	-1,603,105,367	1,780,762,001	-0.90023561043
2005	-3,681,847,783	3,898,942,903	-0.94431949239
2010	-5,343,571,172	6,182,021,606	-0.86437277521
2016	-13,465,147,246	15,689,450,970	-0.85822934606

Source: calculated by author based on UN COMTRADE database

Table 13: USA Specialization Index to China

Year	① USA Aircraft Export Amount to China - China Aircraft Export Amount to USA	② USA Aircraft Export Amount to China + China Aircraft Export Amount to USA	TSI(= ①/②)
1995	1,150,018,574	1,201,493,490	0.9571575573
2000	1,603,105,367	1,780,762,001	0.90023561043
2005	3,681,847,783	3,898,942,903	0.94431949239
2010	5,343,571,172	6,182,021,606	0.86437277521
2016	13,465,147,246	15,689,450,970	0.85822934606

Source: calculated by author based on UN COMTRADE database

3.3. Comparative Competitiveness for Market share for Aircraft Industrial Structure between China and USA

Market share is the percentage of sales in a market acquired by a particular company. Markets are often collapsed geographically. Corporation need to pay attention market change with a top attention to measure the market's trend. We also use it as a guidance for products, marketing and pricing.

Generally, we usually regard a high market share to high profits. By the way, high market share ratio also involves increased risk. It means that the high market share is targeted by the competition companies and harsh regulations.

When we review <Table 17> throughout whole research period from 1995 to 2016, USA has been continuously increasing aircraft export volume to world market up to 2016 except 2010 compared to those of China as 0.36 in 1995, 0.37 in 2000, 0.41 in2005, 0.35 in 2010 and 0.40 in 2016 compared to those of China as 0.002 in 1995, 0.004 in 2000, 0.004 in 2005, 0.005 in 2010 and 0.010 in 2016. Especially, we can realize that the market share in 2010 is little bit lower than other years. We can the reasons as follows: In 2010, USA has downward trend in real income index as well as standstill about retail sale volume and consumer's price index is also increasing.

However, USA has possessed overwhelmingly market share in the aircraft industry, which express USA has sufficient production capability with competitiveness against China aircraft industry and USA aircraft industry is overwhelmingly dominant market share against China aircraft export to world market. We can easily find out USA's aircraft industry is pretty much absolute superior advantage rather than that of China in the analytic research data table.

Table 14: China Aircraft Export Amount to World

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	China	World	88	$144,415,871
2000	Export	China	World	88	$535,736,955
2005	Export	China	World	88	$745,972,370
2010	Export	China	World	88	$1,265,231,817
2016	Export	China	World	88	$3,364,512,155

Source: calculated by author based on UN COMTRADE database

Table 15: USA Aircraft Export Amount to World

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	USA	World	88	$25,630,603,264
2000	Export	USA	World	88	$41,044,092,019
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Source: calculated by author based on UN COMTRADE database

Table 16: World Total Aircraft Export Amount

Unit Price: US$

Period	Trade Flow	Reporter	Partner	Code	Trade Value
1995	Export	World	World	88	$69,402,848,062
2000	Export	World	World	88	$110,669,154,649
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2010	Export	World	World	88	$223,101,889,528
2016	Export	World	World	88	$332,538,769,992

Source: calculated by author based on UN COMTRADE database

Table 17: Market Share for 2 country's Aircraft Industry (%)

Year	Trade Flow	China	USA	Competitiveness based on market share
		(China Aircraft Export Amount to World/World Total Aircraft Export Amount)	(USA Aircraft Export Amount to World/World Total Aircraft Export Amount)	
1995	Export	0.00208083494	0.36930189437	USA
2000	Export	0.00484088775	0.37087201171	USA
2005	Export	0.00485666821	0.41342377751	USA
2010	Export	0.00567109413	0.3568679905	USA
2016	Export	0.01011765382	0.40527556338	USA

4. Conclusions

This research study empirically analyze how China-USA trade dependency is moved over 20 years(1995, 2000, 2005, 2010, 2016) through revealed comparative advantage index, market share, trade specialization index. According to research results in this paper, we can figure out which country is more competitive in 2 countries in the aircraft industry. The main target for this analysis is to understand what country is more competitive in their trade structure. Expecting effect is to learn how to improve aircraft industry in 2 countries. Generally, both China and USA are not easy to obtain data especially, in the overseas production field as a business secret which is one of research limitation in every research scopes.

Even though Chinese aircraft industry looks like strong and more advantage against those of other countries based on competitive labor work wages and low price of raw material and resources, Actually, USA has overwhelmingly dominant advantage against that of China in the field of aircraft industry because USA has abundant capitals and up-to-date advanced high-technology as top of world economic communities. Additionally, even if USA aircraft industries hold a dominant position so far, if USA proposes sound competition relationship with China about aircraft industry, both 2 countries' future will be bright as their cooperation will make synergy effects for mutual benefits under current circumstances in 2 countries.

First, by reviewing the calculated RCA index of 1995 is 0.0702 which means that Chinese aircraft industry has comparatively low advantage rather than other industries in USA. Furthermore, the RCA index of 2000 is 0.0966 which means the index figure was very small quantity advanced. But, those are far below from +1 and even in 2005, the index was downward as 0.0439 compared to that of 2000. However, from 2010 and 2016, the RCA degree upward to 0.0995 and 0.1350 each respectively, which were getting improved gradually. The RCA index value is still far from +1. Therefore, we can come to conclusion that during whole research period from 1995 and 2016, Chinese aircraft industry has deeply non-competitiveness against USA industry. On the contrary, from 2010, Chinese aircraft industry was tried to improve continuously even though figure index are pretty much trivial quantity.

Second, per reviewing index of trade specialization at <Table 12>, during whole research period from 1995 to 2016, China's TSI are much closer to figure −1 which means China's aircraft industry is not export advantage as export specialization is very low while import specialization degree is high. However, when we review figures at Table data, the TSI is getting to try to approach degree 0 which means from 2010, China's aircraft industry has been increasing aircraft export to USA continuously even though those figure are still very trivial. On the one hand, according to USA trade specialization index in <Table 13>, USA TSI are as 0.9571 in 1995, 0.9002 in 2000 and 0.9443 in 2005, 0.8643 in 2010 and 0.8582 in 2016. During the whole research period, from 1995 to 2016, all figure digits are much closer to +1 degree representing plus (+) marks. That means that USA aircraft industry has overwhelmingly export specialization against that of China even though degree of trade specialization are little bit down from 2010 as 0.8643 and 0.8582 in 2016. Those figures are still much stronger between −1 and +1. Finally, we can conclude that USA in aircraft industry has advantage for export specialization, while China in aircraft industry has superior advantage in the import specialization resulting from research analytical data on <Table 12> and <Table 13>.

Third, When we review <Table 17> throughout whole research period from 1995 to 2016, USA has been continuously increasing aircraft export volume to world market up to 2016 except 2010 compared to those of China as 0.36 in 1995, 0.37 in 2000, 0.41 in2005, 0.35 in 2010 and 0.40 in 2016 compared to those of China as 0.002 in 1995, 0.004 in 2000, 0.004 in 2005, 0.005 in 2010 and 0.010 in 2016. Especially, we can realize that the market share in 2010 is little bit lower than other years. We can the reasons as follows: In 2010, USA has downward trend in real income index as well as standstill about retail sale volume and consumer's price index is also increasing. However, USA has possessed overwhelmingly market share in the aircraft industry, which express USA has sufficient production capability with competitiveness against China aircraft industry and USA aircraft industry is overwhelmingly dominant market share against China aircraft export to world market. We can easily find out USA's aircraft industry is overwhelmingly absolute superior advantage rather than that of China in the analytic research data table.

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