Comparative Advantage and Growth of Selected ICT Services in India and China

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DOI: 10.26573/2023.17.1.2
Volume 17*, Number* 1
January 2023*, pp.* 19-26

The study aims to understand the growth and advantage of the country in exporting ICT services. To see the export growth and comparative advantage of Indian and Chinese ICT services, secondary data for both countries have been extracted from trade map from 2009-2019. RCA using Balassa Index and RSCA have been used to analyze comparative advantage. Exponential growth analysis used to see the growth rate of ICT services within the period. Both countries have revealed comparative advantage in computer services but have declining growth rates over the period of time. For telecommunication service export which did not revealed a comparative advantage but shown positive growth in India and declining growth in China. Therefore India has the potential to grow in the same sector and need to take necessary action by the government as well as industry.

Keywords: ICT Services, Export, RCA, Growth, India, Telecommunication Services, China.

1. Introduction

The government of a country always gives efforts to analyze various sectors which contribute to the economy and ensure the growth of significant sectors. Export services form an increasingly essential engine for international trade and give a significant contribution to the economy. The service sector represents one of the fastest-growing areas in the global trade. World's top export services are travel, miscellaneous business services, transport, telecom/computer/information services, financial services, intellectual property use, insurance/pension services, construction, maintenance/repair services, government goods and services etc. According to the statistics published in (Knoema, 2019) exports of services from India increased from 14,508 million US dollars in 1999 to 204,955 million US dollars in 2018, growing at an average annual rate of 15.98%.

Whereas United Nations Conference on Trade and Development (UNCTAD) has defined ICT enabled services which includes Telecommunications, Computer Services (including computer software), Sales and marketing services not including trade and leasing services, Information, Insurance, Financial, Management administration and back office, Licensing, Engineering, related technical, R&D, education and training services. ICT has been one which continuously gained global market attention.

Advancements in information and communication technologies have created unprecedented opportunities to service providers in both developing and developed countries. The Telecom, computer and information services are one of the top exported sectors. Chief exporter of telecommunications services is United States of America. As of 2017, telecommunications services exports in the United States of America was 12,061 million US dollars that accounts for 29.39% of the world's telecommunications services exports. The top 5 countries (others are Netherlands, Kuwait, India, and Japan) account for 55.76% of it. India's exports of telecommunications, computing, and information services totalled 58,248 million US dollars in 2018. Export in this sector increased with the average annual rate of 6.38% in India. China increased from 7,710 million US dollars in 2009 to 47,058 million US dollars in 2018 growing at an average annual rate of 23.72%, although China is not among the top five exporters. The present study measures the export performance of selected ICT enabled services in India and China in the past decade (2009-2019).

2. Literature Review

Number of studies has been conducted to measure the performance and intensity of export of various product and services. Revealed Comparative Advantage (RCA) is one of the accepted indexes to measure the variations in exports according to different sectors and economy. (Mallick,2016) measured the RCA of ICT industry for India and China and revealed that India is enjoying comparative export advantage than China. Involvement of China to ICT services is restricted because of high demand in the domestic market and India may have an opportunity to further explore global market. But India's share in the ICT market has also been decreased over the period of time. These results were also supported by (Cunha and Forte, 2017) where study analyzed comparative advantage in service sector for ten biggest developing countries and depicts that India has a comparative advantage in computer and information services while Macao, Thailand, and Turkey have a comparative advantage in travel services, on the other hand China, Hong Kong, India, and Taiwan have a comparative advantage in other business services. Korea has a comparative advantage in construction and transportation services, and Singapore has a comparative advantage in financial and transportation services.

(Burange etal., 2015) analyzed the Indian service export through Revealed Comparative Advantage (RCA), Trade Specialization Index (TSI) and Trade Complementarity Index (TCI) for the period of 2001-2010 and depicts that India experienced competitiveness in knowledge and skill-based services rather than labor intensive services, also India has export competitiveness in computer and information services although with low degree of TSI in information services. India's complementarily in computer and information services with the developed and developing countries is relatively high because of cost efficiency and skilled labor force. (Khurana and Nauriyal, 2017) analyzed comparative advantage between 2004-2013 using modified revealed symmetric comparative advantage index and conclude that India has a strong comparative advantage mainly in business services and computer and information services. The study also employed Galtonian regression and the Markovian transition matrices to study the distribution and intra-distribution

dynamics of export patterns which showed steady but broadening pattern of specialization of India's services exports.

(Sood, 2014) studied the export of service sector during post reform period. India enjoyed a comparative advantage in exports of communication services and is a prime exporter among the top five exporters in the world in 2005. India has also revealed RCA in IT industry however the RCA in case of computer and information services has been declining. (Kaur, 2016) depicted the performance of SAARC countries in service sector. The RCA from 2002-2013 calculated which revealed that India managed to produce and export contemporary services and experienced comparative lead and specialization. Furthermore, the performance of service exports demonstrates that India has emerged as the largest SAARC country in service exports, particularly during the post-WTO and GATS period.

(Hisanga, 2008) looked at the RCA for service export from the United States. In knowledge-based services, the United States enjoys a significant comparative advantage. The RCA has also been used in other sector and products. (Seyoum, 2007) also used RCA technique to see the export performance of competitiveness of selected services: business, financial, transport and travel services in developing countries for 1998-2003.

(Maryam, 2018) measured trade intensity of BRICS member. Russia has appeared as the major trading partner with EU in BRICS for the year 2015; the study revealed that Brazil and Russia have relative advantages in natural resource-based products, while India and China acquired comparative advantages in manufactured and processed products.

The export similarity index reveals that India and China are competing in the EU. (Kathuria, 2008) looked at India and China's comparative advantage in the garment business in the export trade. It analyses export data using Balassa's (1965) Index of Revealed Comparative Advantage (RCA). This article also demonstrates the shift in India and China's comparative advantage between 1995 and 2003.It also identifies several restrictions that are limiting India's export share in the global market, as well as policy recommendations for increasing India's export share in the global garment trade.

Many Studies have been conducted to see the impact of export on the economy. (Velan, 2019) analyzed the relationship among the software and services export, investment in information technology (IT) and GDP in India. By using the Cointegration and vector error correction model the author revealed that software and service export, investment in IT and GDP are cointegrated, resulting that there exists the long-run equilibrium relationship among these variables Also, and vector error correction mechanism Granger causality results that software and services export is an important factor of economic growth in India. Author further explained that diversification of software and service exports, and investments in R&D are requirement of growing competitive global market.

The past studies shows that there is an increased demand of ICT services at global level and at the same time there is a stiff competition between India and China although US is one of the leading among all. Most of the studies also showed that India has been experiencing growth in computer services and has potential to increase its share therefore continuous monitoring on all the aspect of export of ICT services will guide the country to take necessary action as and when required to

perform better. Literature also supported that RCA is one of the robust techniques to measure the export performance of any sector. The present study tries to see the export performance of ICT sector and growth over the period of time in India and China.

Objectives

The objective of the study is to measure the export performance of selected ICT services; telecommunications, computer, and information services by Revealed Comparative Advantage (RCA) using Balassa Index and Revealed Systematic Comparative Advantage (RSCA)between 2009-2019 for Indian and Chinese economy. The primary purpose of the study is to determine the comparative advantage of selected services being traded over the period of time and then measure the growth of the calculated Index of RCA.

3. Methodology

To see the export performance growth, Secondary data of ICT export from China and India has been extracted from Trade map (Trade Statistics for international business development) in March 2020. The study considered Information, telecommunication and computer services for the study but export data for information services in China was not available, therefore RCA could be calculated for only telecommunication and computer services.

Revealed Comparative Advantage

RCA is an index used in international economics for calculating the relative advantage or disadvantage of a certain country in a certain class of goods or services in the trade flows. It is based on the Ricardian comparative concept. It most commonly refers to an index, called the Balassa Index, introduced by (Balassa and Noland, 1965).RCA can be expressed in the following terms

$RCA_{ij} = (\sum Xij/\sum Xi) / \sum Xwj/\sum Xw$
Where Xij *= Export of* j^{th} *industry by* i^{th} *country*
Xi *= Total industry export by* i^{th} *country*
Xwj *= World commodity export of* j^{th} *industry*
Xw *= Total industry export by world*

The RCA index lies between 0 to ∞. If the value of calculated RCA index is greater than one, then it depicts that country has revealed comparative advantage in export of product and if the value of calculated RCA index is lesser than one then that indicates the country shows its comparative disadvantage capability in the product.

The calculated RCA method was further redefined by (Dalum et al., 1998) and modified as revealed symmetric comparative advantage (RSCA), which can be represented as:

$RSCAij = (RCA_{ij} - 1) / (RCA_{ij} + 1)$

The value of RSCA lies between -1 to +1. RSCA represent the revealed symmetric comparative advantage of country for product if the value will be above 0 (zero) and vice versa if the value will be below 0 (zero).

Growth Rate

Growth rate of RCA of selected export services from India and China has been determined by the following Exponential Regression Model.

$Y = \alpha\beta^t$

Log Y = Log α + t Log (βi), where Y = RCA; t = time (2009-2019)

Annual compound growth rate (r) was computed as: *r = {Anti log (βi)-1} x100*

4. Results and Analysis

Table1 shows that China and India both revealed comparative advantage in export of computer services as the value of RCA indices for both the country is greater than 1, although the RCA has been decreased from 2009 to 2019, but in Telecommunication services the value of RCA is lesser than 1 which depicts that both China and India do not have export advantage in this product category. India also does not have comparative advantage in Information services as the value of RCA is less than 1 in the studied period. The RCA of information technology for China could not be computed due to incomplete information available on secondary data base.

Table 1 *Showing Revealed Comparative Advantage (RCA) for India and China*

Year	RCA of China		RCA of India		
	Computer Services	Telecommunication Services	Computer Services	Telecommunications services	Information services
2009	1.37	0.48	1.52	0.15	0.20
2010	1.42	0.36	1.52	0.11	0.23
2011	1.36	0.40	1.49	0.11	0.07
2012	1.27	0.43	1.38	0.12	0.07
2013	1.35	0.35	1.44	0.14	0.05
2014	1.28	0.29	1.31	0.18	0.08
2015	1.24	0.33	1.27	0.19	0.06
2016	1.23	0.34	1.25	0.23	0.11
2017	1.21	0.37	1.23	0.23	0.13
2018	1.21	0.29	1.21	0.27	0.08
2019	1.21	0.30	1.22	0.26	0.08

Table 2 *Showing Revealed Systematic Comparative Advantage (RSCA) for India and China*

Year	RSCA of China		RSCA of India		
	Computer Services	Telecommunication Services	Computer Services	Telecommunications Services	Information Services
2009	0.15	-0.34	0.20	-0.73	-0.65
2010	0.17	-0.46	0.20	-0.78	-0.61
2011	0.15	-0.42	0.19	-0.79	-0.86
2012	0.12	-0.39	0.16	-0.77	-0.85
2013	0.15	-0.48	0.18	-0.74	-0.89
2014	0.12	-0.54	0.13	-0.69	-0.84
2015	0.10	-0.50	0.12	-0.67	-0.87
2016	0.10	-0.48	0.11	-0.62	-0.80
2017	0.09	-0.45	0.10	-0.62	-0.76
2018	0.09	-0.53	0.09	-0.56	-0.84
2019	0.09	-0.54	0.09	-0.55	-0.87

Table 2 showing revealed symmetric comparative advantage (RSCA) which also depicts that India and China both have advantage in exporting computer services as RSCA of computer services is greater than 0 for both the country but negative for all the other services.

The results of regression and growth rate in Table 3 shows that from 2009-2019India has observed very slow aggregated growth of 3.9%. The negative growth of RCA for Computer service (-6.4%), Information services (-12.93%) but observed positive growth of RCA for Telecommunication services (23.31%). On the other hand, China has also observed aggregated growth of-11.9% with negative growth of RCA for computer service (-3.9 %) and telecommunication services (-7.9%).

Table 3 *Showing the Results of Exponential Regression Model and Compound Rate of growth*

	R	**R^2**	**Adjusted R^2**	**F**	**β**	**Antilog β**	**CAGR% ={Antilog(B)-1}*100**
Ind CS RCA	0.96	0.93	0.92	115.53	-0.03	0.93	-6.46
Ind Tele RCA	0.89	0.79	0.76	30.530	0.09	1.23	23.31
Ind Inf RCA	0.37	0.14	0.03	1.3400	-0.06	0.87	-12.90
Aggregate Growth of ICT Services in India							**3.92**
CHN CS RCA	0.91	0.83	0.81	39.720	-0.017	0.96	-3.94
CHN TELE RCA	0.69	0.48	0.42	7.5680	-0.036	0.92	-7.96
Aggregate Growth of ICT Services In China							**-11.90**

5. Conclusion and Discussion

Service sector is most important contributing sector in the world economy. According to ICT report published in 2019 the overall export intensity for the potential ICT-enabled services was 34%. Among the 9 categories of potential ICT-enabled services, export intensities of Computer services (including computer software), Management, administration and back-office services were found to be as high as 89% and 85% respectively. Information services and Engineering, related technical services and R&D services with export intensities 67% and 64% respectively, were also largely dependent on exports. Financial services had the lowest level of export intensity.

India and China both export number of products and services to the global market. But both the countries are not experiencing the relative significant advantage in the export of Computer, information and telecom service. Although as computer services have relative advantages in export performance as ICT report also supports the same but has been decreased over the period of time. Telecom sector is being appreciated in India although the computed RCA index value shows lower comparative advantage but the index has been increased and showed the significant growth in the trade. Therefore, India can attain potential advantage by exploring the market for internet telecommunication and broadcasting services. China has contradictory situation as the growth has been declined in telecom sector.

Trade in information services showed very disappointing results as India has not experienced significant comparative advantage also declined over the period of time. Hence the strategic changes need to be made in the information services such as

Audiovisual and related services, On-line audio video content, Radio and television broadcast originals, Home programme distribution services, basic programming, Radio and television channel programmes, On-line books, On-line gambling services, News agency services, Library and archive services, Original compilations of facts/information, On-line newspapers and originals, On-line directories and mailing lists, On-line adult content, Web search portal content, Other on-line content package etc.

India has been in the better position than China in exporting these services. To sustain the advantage Indian policy maker need to categorize the different services which are more popular and demanded in the global market. Computer services one of those which need exceptional strategic attention because the growth is declining in India. More efforts are required to promote licensing services for the right to use computer software, software downloads, On-line games /software, IT consulting and support services, IT infrastructure and network management services, maintenance and repair services of computers and peripheral equipment, other education and training services. Telecom sector is the budding service sector in export therefore effective strategies need to be framed to gain the potential benefits and advantage to mark significant presence in the global market.

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