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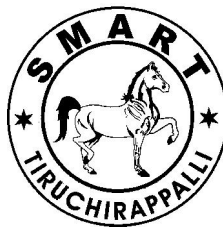
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ASSESSING PPPs IN INDIAN PORTS : THE BOUNDARY CONDITIONS

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Abstract

The purpose of this paper was to examine the boundary conditions, for the operation of Public Private Partnerships (PPPs), in India's Port Sector. Trade in this sector, accounted for about 43 per cent of India's Gross Domestic Product (GDP) in 2015-16. India's economic transformation increasingly depends on trade and the availability of ports and associated trade-related infrastructure would act as critical constraints on such trade-led growth. Given the fiscal constraints, PPPs have emerged, as the preferred model, for the development of such port infrastructure. The approach followed was to compare major and non-major Indian ports, with an international benchmark port, the Port of Rotterdam, to understand the existence of such boundary conditions, i.e. the minimum conditions required at the boundary of a domain, which can encourage entry of the private sector through PPPs.

Keywords: Boundary Conditions, International Benchmarks, Major Indian Ports, Non-major Ports, Port Infrastructure, Public Private Partnerships.

JEL Code: F18, F19.

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1. Introduction

The trade, in merchandise goods, constitutes a significant portion of India's GDP and it has been increasing over the years. The trade intensity of India's GDP increased from 14% in 1991-92 to about 43% in 2015-16 (**Reserve Bank of India, 2015; Ministry of Statistics and Programme Implementation, 2016**). World trade volume, according to the World Trade Organization (WTO), is projected to grow by 2.8% in volume terms in 2016 and 3.6% in 2017 (**WTO, 2016**). The expanding share of India, in global exports and imports, is 1.7% and 2.5% respectively. Accelerating India's trade would depend crucially on a host of micro and macro factors, of which the important

factors which cause obstruction of India from becoming a larger player in global trade, are related to port and associated trade-related infrastructure. The Global Competitiveness Report, 2015-16, ranks India 81st out of 140 countries in terms of infrastructure and within which India ranks 60th in terms of availability of port infrastructure (**World Economic Forum, GCI, 2015-16**). The 'inadequate supply of infrastructure' has been rated as the most problematic factor for doing business in India in the past (**Global Competitiveness Report, 2013-14**). This has been noted by the **Economic Survey of India 2012-13** as, "Even the best of Indian ports do not have state-of-the-art technology as in Singapore, Rotterdam, and Shanghai".

Port Infrastructure issues include poor road conditions and port connectivity, congestions, vessel berthing delays, poor cargo handling techniques and equipment, resulting in multiple handlings, increased lead time, high transaction costs and thus loss of market competitiveness. With a coastline of around 7,517 km, with 13 major ports and 187 non-major ports (**Maritime Agenda, 2011**), along the coast line and islands, almost 95 per cent of India's global merchandise trade by volume and 70 per cent of it by value, is carried out through the sea route. Thus, market competitiveness is crucially dependent on the development of such port and trade-related infrastructure, especially the road, rail and inland water-way infrastructure which could accelerate hinterland connectivity.

The Government has sought to accelerate port infrastructure through the model of Public Private Partnerships (PPPs). The Report of the Task Force on the Financing Plan for Ports (**Govt. of India, 2007**), while pointing out the important role of the quality of port infrastructure in enhancing international competitiveness and spurring trade, recommended the development of ports primarily through PPPs, so as to ensure the requisite investments as well as creation of world class facilities. It further envisaged an investment of INR 68,835 crores (of a total investment of INR 93,385 crores in major and non-major ports over the period 2006-07 to 2011-12) in the form of PPPs. Government policies, designed for encouraging port development, have included measures such as permitting 100% Foreign Direct Investment (FDI), under the automatic route for port development projects and 100% income tax exemption, available for a period of 10 years.

2. Review of Literature

Extant literature, on port management, analyses the efficiency of ports, using Data Envelope Analysis (DEA) (**Cullinane and Wang, 2010; González and Trujillo 2009,**

Roll and Hayuth, 1993). Applying DEA panel data approaches to 25 lead container ports, **Cullinane and Wang (2010)** assessed the competitiveness of container ports, benchmarked best practices and identified specific causes for inefficiencies. Others have used effectiveness, in a marketing sense of 'doing the right things' or those that are most valued by the target customer or user, as the means of measuring port effectiveness (**Brooks and Schellink, 2013**). Irrespective of the means by which efficiency and effectiveness may be defined, it is an accepted fact today that efficient port management, earlier an exclusive function of the Government, can be achieved only through the means of Public Private Partnerships (PPPs). Analysis of the determinants of such PPP arrangements in a multi-country, cross-industry, revealed that government fiscal considerations, especially heavy debt burdens, had an important role in the prevalence of PPPs. Countries, where the aggregate demand and market size were large, where there was overall macroeconomic stability, as also better institutional quality, were conducive to the prevalence of PPPs (**Hammami et al., 2006**). At the industry level, PPP determinants varied across industries, depending on the nature of public infrastructure, capital intensity, and technology required. It was also found that private participation in PPP projects depended on the expected marketability, the technology required, and the degree of "impurity" of the goods or services. The most commonly accepted management model, for ports working on a PPP model, is the 'Landlord Model' (**Asian Development Bank, 2000**), wherein the Government owns port-related land and other basic infrastructure and it is responsible for port planning, as also acts as a regulatory body while the management responsibilities are delegated to the private sector. There are sceptics who would wish to strengthen further evaluations of PPPs and who may question whether or not such PPPs, in long term infrastructure contracts, could deliver effectiveness and value for money

(Hodge and Greve, 2009). Aerts et al. (2014) have explored the 'Critical Success Factors' (CSFs), for sound implementation of PPPs and have listed eight such factors, crucial to the success of port PPPs, which include the concreteness and preciseness of the concession agreement, the ability to appropriately allocate and share risk, the technical feasibility of the project, the commitment made by partners, the attractiveness of the financial package, a clear definition of responsibilities, the presence of a strong private consortium and a realistic cost/benefit assessment and further identify the reason for the criticality of these factors.

3. Statement of the Problem

Nearly 95% of India's global merchandise trade by volume and 70% of it by value, is carried out through the sea route and India's international trade competitiveness is essentially dependent on the availability of port and trade-related infrastructure. The Indian Government has sought to accelerate port infrastructure, through the PPPs model, especially since 2006-07. Facilitating government policies, for encouraging port development, have included permitting 100% Foreign Direct Investment (FDI) under the automatic route for port development projects and 100% income tax exemption available for a period of 10 years. It is important to look at whether the private sector can be encouraged to enter into such PPPs so as to facilitate port development.

4. Need for the Study

The need for this study arises primarily because PPPs have been recognised as critical in ensuring the development of port and related infrastructure in India and there is no study that addresses the issue of boundary conditions, in the context of Indian ports. Given the government's fiscal constraints and the presence of a relatively strong private sector, such a study becomes imperative, to ensure the success of the PPP model, in India's Port Sector. This study can interest private players, both domestic and foreign and encourage their entry through PPPs and help in transforming Indian ports into major world class facilities.

5. Objectives of the Study

This paper looks at the issues, relating to the presence of boundary conditions of Indian ports, to encourage PPPs in port infrastructure. The objectives of the study are:

- a) To understand how Indian ports match international benchmark ports.
- b) To understand the existence of boundary conditions, for successful operation of PPPs, in the port sector.
- c) To understand the policy implications of the existence of such boundary conditions.

6. Hypotheses of the Study

The paper seeks to test the following hypotheses:

NH-1: Indian ports are not equivalent to foreign ports in terms of performance indicators.

NH-2: There exist no boundary conditions, which would affect the success of the working of the PPP models, in India's port infrastructure.

7. Research Methodology

The paper compared the major and non-major Indian ports, with an international benchmark port, the Port of Rotterdam, to carry out a comparison of performance indicators. The paper used government reports and media reports, to test the hypotheses and identify the existence of boundary conditions in India's port sector.

7.1 Sample Selection

The study looked at the 18 major ports and 187 non major ports in India and compared them with the Port of Rotterdam, the international benchmark port. Major ports refer to those ports, which fall under the administration of the Central Government and which are part of the Union List, as opposed to the non-major ports, which are under the administration of the nine maritime States and three Union Territories, and fall within the Concurrent List of the Constitution of India. In 2011-12, the 12 major ports handled about 60 % of the maritime cargo of the country while the balance 40% was handled by the non-major ports.

7.2 Sources of Data

Secondary data, retrieved from various databases such as the Indiastat statistics, Indian Ports Association statistics and the Port of Rotterdam statistics, were used in the study.

7.3 Period of the Study

The period considered for the study was 10 years, from 2005-06 to 2014-15.

7.4 Tools Used in the Study

Content analysis was used to analyze the data.

8. Empirical Analysis

8.1 Indian Ports Vs. International Ports

The Indian Port Sector, comprising of 13 major ports, spread over the Kandla-Kolkata (K-K) range, covers a coastline of about 7000 km. In addition, there are 187 non-major ports (including both minor and intermediate ports), spread across nine maritime States and four Union Territories. The North-West European H-H (Hamburg–Le Havre) range, covers 11 major ports, over a coastline of some 1,000 km and includes the Port of Rotterdam. The Rotterdam Port itself is the largest seaport of Europe and the largest logistic and industrial hub of Europe. The Port stretches out over 40 kilometres and it is about 12,500 ha (including Maasvlakte 2).

8.1.1 Traffic Handled, Capacity Available and Capacity Utilization

The traffic handled by the major Indian ports, in 2014-15, was 581.344 m tonnes while non-major ports handled 470.87 m tons. A more interesting insight is that while traffic handled by non-major ports almost doubled between 2006-07 and 2014-15 (from 186.1 to 470 M tons), what was handled by major ports, increased by much lesser degree over the same period (from 464 to 581 M tons). It is interesting to note that the cargo-handling capacity of major ports grew much more than the traffic (from 516 to 871.52 m tons), leading to lower capacity utilization. Further, capacity utilization in major ports is likely to increase at a much lower rate than in non-major ports over the period 2009-10 to 2019-20

(Table-1). The annual throughput for the Port of Rotterdam (POR) in 2015 was 466.4 million tons of cargo. Thus, traffic handled by all major Indian ports put together, is still only marginally higher than individual international benchmark ports like the Port of Rotterdam.

8.1.2 Traffic Projections

The traffic, as also the capacity of major Indian ports, is likely to grow at a relatively more subdued rate as compared to non-major ports, over the next decade (2011-12 to 2019-20). According to the Table-2, the capacity of major ports is projected to grow at 9% by 2019-20, while traffic is projected to grow at a CAGR of 8.03%. With traffic growing at a slower pace than capacity, capacity utilization of major ports may drop even further. The non-major port traffic of maritime States is projected to grow at a CAGR of 16.06%, double that of the major ports while the capacity of these ports is projected to grow at 17.04%, through the development of existing ports and by setting up new ports. The Port of Rotterdam will double the volume of throughput in 2030, compared to 2011 (**Port of Rotterdam website**). The projected traffic increase (245%) in major Indian ports is likely to far outweigh that of the POR (60%).

8.1.3 Port Management Models

The Indian Port Sector follows primarily the ‘Services Port Model’, with port trusts acting as port authority as well as a port operator, as opposed to the ‘Landlord Port Model’ of the Port of Rotterdam (Table-3). In India, almost all major ports are public service ports with private terminals, regulated by port trusts (except Ennore). Non major ports, on the other hand, come under the purview of the respective State Governments and they are regulated by state departments, or the state maritime boards. The Port of Rotterdam follows a ‘Landlord Port Model’ where instead of the port providing both commercial and regulatory functions, the private sector is invited to set up and operate commercial facilities while the port authorities continue to own the land and basic infrastructure

assets as well as their regulatory functions. Other examples of landlord ports are Antwerp, New York, and Singapore. The Port of Rotterdam was able to attract increasing private investments, averaging € 1.5 billion per year up to 2011. In March 2015, the port authorities announced a decline in investments by 27.9% to € 189 million from the 2013 figure of €262.9 million. The lower level of investment was attributed to the completion of the first phase of Maasvlakte 2 (**Port of Rotterdam, Press Release, 2015**). Up to 2030, the port of Rotterdam aims to attract € 25 to 35 billion in private investments from market leaders- mostly through Foreign Direct Investment (FDI). Thus, the role of the private sector, both domestic and foreign, in such a landlord model of port management is strong unlike the Services Port Model of Indian ports where private sector role is weak.

8.1.4 Hinterland Population and Connections

Hinterland connectivity is an important factor, affecting external trade and in the process, the development of the economy. Inadequate connectivity leads to congestion, time and cost escalations. The hinterland population in the entire Kandla-Kolkata belt, that Indian ports are expected to serve, is more than 1500 million, while Rotterdam is the gateway to a European market of more than 350 million consumers. The POR has various intermodal sources of transport like rail, roads, pipelines and inland waterways, for inland connectivity and there is fierce competition amongst the modes of connectivity. But intermodal transport in India is inadequate. The port website further talks of modernization of the ICT system to coordinate the activities of the port. There was a skewed pattern in port connectivity, with railways moving only 24% of the port traffic, compared to 1.34% of port traffic they should have moved. Further, the major ports have 30% share and State ports with 8 %, indicating the low rail connectivity to ports other than the major ports. Roads, by contrast, carried 36 % of the traffic as compared to 22 % they should have carried (**World Bank, 2007**).

8.2 Performance Indicators

The data regarding performance parameters of Indian ports are available for major ports (**Table-4**). The Turnaround Time (TAT) is an indicator of the average sailing time of sea-going vessels, larger than 150 metres from the sea to the berth and vice versa. The TAT thus shows the time ships need to get to their destination in the port from the sea, and vice versa. The average TAT, for major Indian ports, was 4.56 days in 2011, which was reduced to 2.1 days in April-November 2014. In 2015, sea-going ships visited Rotterdam a total of 29,122 times. In 2012, actual TAT for the Port of Rotterdam was 4 hours and 30 minutes as against a target of 4 hours and 27 minutes (**Port of Rotterdam Annual Report, 2012**). The weighted average, pre-berthing detention time, for all major Indian ports in 2013-14, was 1.48 days. The average berth occupancy -i.e. the time that the berth is utilised divided by the total available time, for major ports in India in 2011 was 65.68 %. The average output per ship berth day in the major ports in India in 2013-14, was 12509 tons. The percentage of idle time at Berth to Time, at working berth for 2011-12, for all major ports, was 23.3%. In addition, other performance indicators such as the average dwell time (3.78 days), crane productivity (20 moves/ hour) and Vessel Evacuation rate (40 containers/hr), fall much short of international norms such as those exhibited by the Port of Singapore (0.60 days, 30 moves/ hr. and 100 containers /hour respectively) (**IPA, 2007**).

8.3 Port Characteristics

Indian ports exhibit mostly outdated cargo handling equipment, which handle a large proportion of old (more than 20 years) and small-sized coastal fleet in major ports, as opposed to the modern cargo handling equipment and modern fleet in the Port of Rotterdam (**Table-5**). Several industrial clusters are reported around the Port of Rotterdam (Antwerp, Rotterdam), while in India, there are no industrial clusters around major ports and there is slow emergence

of logistic clusters in the form of SEZ. Major Indian ports operate at near capacity, as opposed to availability of spare capacity in Rotterdam. Major ports in India, with 75% of market share virtually form a cartel, with hardly any competition amongst them. Again, the absence of insufficient and inefficient supply of hinterland infrastructure, prevents intermodal competition among these ports, with the exception of JNPT. The high port costs in India and the present regulations, prevent international port competition for trans-shipment. However, there is increasing competition from the private ports and minor ports. As opposed to this, there exists strong competition in the Port of Rotterdam.

8.4 Financial Performance Analysis

The operating surplus, for all major ports in 2015, was INR 361050 lakhs (**Table-6**).

The revenues of the major ports, in 2007-08, were approximately twice as high as the revenues of the Port of Rotterdam. Further, it was estimated that the revenues of the major ports would be double by 2013-14, compared to a 30% growth in the revenues of the POR. The operating expenses of the major ports were approximately three times higher than in the Port of Rotterdam in 2007-08, mainly on account of higher salaries and social charges. In Rotterdam, this cost component was relatively small, due to its being a Landlord Port. Operating expenses, at the POR, is expected to grow by 23% by 2013-14, mainly because of increasing maintenance costs, as opposed to a 19% growth of the operating expenses at the major ports. This is likely to occur in major Indian ports on account of most ports downsizing the number of employees in this period as also BOT contracts in the case of new terminals. It appears that major Indian ports (as also non-major ports) seem to be in a favourable future financial position compared to international ports.

9. Findings and Suggestions

There are several changes in the Boundary Conditions which would necessitate and facilitate changes in the existing models of

port management. The Indian economy is growing. Currently, about 43% of GDP is contributed by the merchandise trade sector. A serious funding gap, in financing infrastructure, has emerged in the XI and XII five year plans, estimated at 18% of the estimated requirement in 2010-11 and 2011-12. While Government funds have competing demands, such as, education, health, employment generation, etc. and given that there is a limit to the Government's financing of infrastructure, especially in the context of a rule based fiscal policy framework (**Khan, 2011**), it is important to explore other avenues for financing infrastructure. Further, with the Euro zone crisis, posing constraints on external sources of financing infrastructure (such as through ECBs), a viable alternative to development of such infrastructure has emerged in the form of Public-Private Partnerships (PPPs).

The existing system of major ports, accounting for 75% of Indian ports, will account for lower traffic and lower capacity utilization, on account of inefficiencies stemming from lack of competition. This would affect profitability adversely. Traffic volumes are increasingly shifting towards non-major ports. New ports (non-major) as well as intermediate would be more amenable to experimenting with new forms of port management. Financial operating indicators point to a healthy growth, in net operating surpluses of Indian ports, in the forthcoming yearss. This would make it attractive for private investors to invest in ports.

Growth of industrial clusters and logistic clusters (SEZs), with active government support and intervention, to port development activities, will increase the economies of scale.

There are sufficient boundary conditions that exist, PPPs could take advantage of the strengths and opportunities of the Indian ports. PPPs can be encouraged to invest in superstructure (rather than port infrastructure), where risks of investment can be minimized. Rail connectivity to non-major ports is particularly low and inadequate. The rail sector

can be opened up to private participation. More industrial clusters and logistic clusters can be created, to ensure full utilization of ports. With financial indicators, indicating high net operating surpluses in forthcoming years, different revenue sharing agreements may be envisaged.

Thus, **NH-1**: 'Indian ports are not equivalent to foreign ports in terms of performance indicators', is true and hence accepted. At the same time, **NH-2**: 'There exist no boundary conditions, which would affect the success of the working of the PPP models in India's port infrastructure', is not true and hence rejected.

10. Conclusion

The paper finds that there is evidence of the existence of such boundary conditions which could encourage entry of the private sector through PPPs and which can indeed be tapped to facilitate trade-led economic growth in India, through port development, based on a model of PPPs. On the basis of such comparison, the paper suggests that it is important to look beyond conventional routes of PPP participation. Such PPPs can be explored in the non-conventional but more important port-related associated areas, such as improving intermodal port connectivity and in the setting up of industrial and logistic clusters, apart from the operations and management of ports, especially non-major ports. While the financial metrics point to the existence of considerable opportunities, the rigid institutional framework, restrictive revenue sharing agreements and high tariff costs on account of Tariff Authority for Major Ports (TAMP), may prove to be dampeners to greater private sector participation. These would have to be addressed for the port sector, to be able to match the international standards.

11. Limitations of the Study

A longer time frame would have given a better picture of the factors, affecting investments in port infrastructure, by the private sector.

12. Scope for Further Research

The paper points to the direction future research may take in addressing port

management in emerging economies like India, with critical dependence on trade-related growth. The scope for future research includes studying deeply the critical success factors in port efficiency and effectiveness.

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Table-1: Traffic and Capacity of Indian Ports Traffic Projection (in Million Tons)

TRAFFIC	Existing Level	Projections		CAGR (%) Between 2009-10 &	
Ports	2014-15	2016-17	2019-20	2016-17	2019-20
Major Ports	581.344	1031.5	1214.82	9.09	8.03
Maritime States	470.87	987.81	1280.13	19.21	16.06
Overall	1052.214	2019.31	2494.95	13.16	11.37
Capacity Estimation (in Million Tons)					
CAPACITY	Existing Level	Projections		CAGR (%) Between 2009-10 &	
Ports	2014-15	2016-17	2019-20	2016-17	2019-20
Major Ports	871.52	1328.26	1459.63	11.58	9.00
Maritime States	337.89*	1263.86	1670.51	20.31	17.04
Overall		2592.12	3130.04	15.19	18.34

Source: Indiastat **Note:** * As on 31-3-2010

Table-2: Traffic Forecast in the Major Indian Ports (in Million Tons)

Traffic Projections for Major and Non-Major Ports in India (2016-17 to 2019-2020) (In Million Tonne)									
Year	Major Ports			Non-Major Ports			All Ports		
	Pessimistic (Assuming 6% Growth in GDP)	Most likely (Assuming 9% Growth in GDP)	Optimistic (Assuming 11% Growth in GDP)	Pessimistic (Assuming 6% Growth in GDP)	Most likely (Assuming 9% Growth in GDP)	Optimistic (Assuming 11% Growth in GDP)	Pessimistic (Assuming 6% Growth in GDP)	Most likely (Assuming 9% Growth in GDP)	Optimistic (Assuming 11% Growth in GDP)
2016-17	881	1077	1227	449	571	664	1331	1648	1891
2017-18	936	1176	1364	483	633	750	1419	1809	
2018-19	993	1284	1517	519	700	845	1513	1985	
2019-20	1055	1402	1687	557	774	951	1612	2176	
2006-26								245%	

Source: Indiatat, 2016.

Table-3: Port Management Models

Port	Infrastructure	Superstructure	Stevedoring/ Labour	Other Functions
Landlord Port	Public	Private- domestic and/or foreign	Private- domestic and/or foreign	Public/Private
Public Service Ports (12 Major Indian Ports)	Public	Public	Public	Public

Source: IPA, 2007

Table-4: Performance Indicators of Major Ports in India: 2006-07 to 2013-14

Performance Indicators-Major Ports	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
a) Total Cargo Vessels Sailed (Nos.)	19171	20168	21529	21366	22047	22022	-	-	-
b) Av. Turn Round Time (Days)	3.63	3.65	3.98	4.2	4.63	5.29	4.56	3.94	-
c) Av. Pre-berthing Detention (Days)	1.11	1.2	1.55	1.63	1.96	2.32	2.05	1.79	1.48
On Port Account	0.36	0.39	0.46	0.39	0.4	0.5	0.45	0.5	-
On Non Port Account	0.75	0.81	1.09	1.24	1.56	1.82	1.6	1.29	-
d) Output per ship berth day (Tonne)	9543	10326	9440	9669	9215	9140	10575	11800	12509

Source: Indiatat, 2016.

Table-5: Coastal Fleet by Age and Size of Vessels in India (As on 31st December, 2014)

Age/ Size		Below 999	1000- 4999	5000- 9999	10000- 19999	20000- 34999	35000 Above	Total
Upto 5 Years	No.	99	73	4	0	0	1	177
	GRT	28369	129350	26849	0	0	44861	229429
6 to 10 Years	No.	87	19	4	0	0	0	110
	GRT	24777	46129	29816	0	0	0	100722
11 to 15 Years	No.	77	17	5	1	0	0	100
	GRT	22625	30388	39356	14239	0	0	106608
16 to 20 Years	No.	73	20	0	0	1	0	94
	GRT	20452	37423	0	0	22521	0	80396
Above 20 Years	No.	247	93	9	7	6	3	365
	GRT	92373	187307	57422	85960	161293	116887	701242
Total	No.	583	222	22	8	7	4	846
	GRT	188596	430597	153443	100199	183814	161748	1218397

Source: Indiatat , 2016 **Note:** GRT- Gross Registered Tonnage

**Table-6: Operating Financial Parameters for Major Ports in India
(2006-2007 to 2014-2015) (in Rs. Lakh)**

Ports/Year	Operating Income	Operating Expenditure	Operating Surplus
2006-07	583944	319593	265456
2007-08	631231	343152	288079
2008-09	667503	406039	261464
2009-10	719903	472143	261464
2010-11	757684	487140	195360
2011-12	795197	528029	253813
2012-13	NA	-	267168
2013-14	NA	-	251890
2014-15	NA	-	361050

Source: Indiatat, 2016