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1. Introduction

There has been a significant change in the market structure of India's telecommunication service industry after the entry of R-Jio in 2016. The number of telecom service operators has been reduced from thirteen in the year 2014 to only four. At present, apart from R-Jio, other operators are Airtel, Vodafone Idea, and a public sector company BSNL[1]. This paper aims to analyse the entry of R-Jio into the telecom sector in India and how a telecom operator, Airtel, had to exit the market as it could not compete with R-Jio. The paper is divided into the following sections: in section 2, we will discuss the performance of the telecom sector in India; in section 3, we will review the existing literature, section 4 is on the methodology of this study, in section 5 the entry of R-Jio will be analysed, section 6 is on impact of the R-Jio on the performance of Airtel and in section 7 we will make concluding observations.

2. Telecommunication service sector in India

Telecom services in India can be divided into two major segments: (a) telephones – mobile or fixed-line and (b) internet services. As a result of various policy measures since 1994, mobile phone and internet services have registered a spectacular growth in India. Tele-density measured by the number of telephones per 100 people increased to 88.81 percent in November 2019 from less than 1 percent during the early 1990s [2]. Today this industry has become the second-largest network in the world, next only to China. The National Telecommunication Policy (NTP) announced in May 1994, initiated the participation of the private sector in basic telecom services, ending the monopoly of government services. The entry of private players necessitated the existence of an independent regulator in the sector; therefore, the Telecom Regulatory Authority of India (TRAI) was established in 1997 to regulate telecom services, protect the interests of service providers, and consumers and for fixation of tariffs. There were several operators present across different circles at one point in time. A 2014 report from Merrill Lynch Global Research compares the Herfindahl-Hirschman (HH) Index for various countries and found India had the lowest market concentration [3]. Average Revenue per User (ARPU) declined continuously from Rs.1,113 in 2001 to Rs.98 in 2013, indicating healthy

competition (Mehta, 2017). TRAI introduced competition in the sector by fixing an upper floor on interconnection and termination charges. TRAI reduced access deficit charges [4] and promoted sharing of infrastructure between service providers. This led to a reduction in entry costs in the sector, and many private sector providers entered the market (Mondal and Singh 2020). It appears TRAI went overboard with policies for telecom growth and overlooked the congestion in the market in the first phase. In December 2013, an empowered Group of Ministers (EGOM) approved a recommendation from the Telecom Commission - the highest decision-making body in the communications ministry, which allowed two or more service providers to merge if their post-merger market share did not exceed 50 percent (previously 35 percent) of the country's subscribers. After new M&A guidelines, the industry witnessed a series of consolidation with several exits and mergers. Videocon stopped operations in 2016, Reliance Communications and Aircel (2016), and Vodafone and Idea Cellular (2017) announced their intention to merge, pending regulatory approvals [5]. Many companies by the time found business was not viable and went for consolidation or decided to exit from the market. Apart from it, there were controversies in 2G (second generation) spectrum allocation. This led to the cancellation of 122 licenses of 12 companies by the Supreme Court. The cancellation of licences allotted in 2007, disturbed the sentiment of foreign investors and telecom operators. The huge cost incurred by operators in purchasing spectrum left them with huge debts and without capital (Mehta, 2017). Reliance -Jio (henceforth, R-Jio) entered the market in 2015, which impacted the other incumbent companies and the industry as a whole to a great extent.

3.Literature review

Waverman and Koutroumpis (2011) constructed Telecommunications Regulatory Governance Index (TRGI) for 142 countries and found a high correlation between TRGI and general political governance. According to their study, India was ranked at 68th position in terms of TRGI globally. However, the rank of India was 6th among 21 Asia & Pacific countries. Hallur and Sane (2018) carried out a comparative analysis of telecom regulatory frameworks of five countries namely, USA, UK, Australia, Malaysia, Brazil with that of India. They observed that for these countries except Malaysia, there is a clear demarcation between policy formulation and policy implementation – the Ministry or Department of Communications is responsible for policy formulation, and policy implementation is entirely left to the regulator. The authors have also observed an absence of a clear role definition between the policy formulation body, the DoT, and the regulatory body, the TRAI, in the case of India. In India, policy implementation

such as licensing is entirely done by the Department of Telecommunications (DoT). In other areas of policy implementation, such as spectrum auctions, the role of TRAI is limited to the submission of its recommendations to the DoT. Apart from DoT, these recommendations are also reviewed by the Telecom Commission (TC) and the Cabinet of Ministers (CoM). The Cabinet under the Prime Minister grants the final approval for the reserve price for the spectrum auction. So, the spectrum auction as a case of policy implementation is undertaken by four entities i.e., TRAI, DoT, TC, and the CoM in India as compared to single regulator for USA, UK, Australia and Brazil. There is also a duplication of regulatory functions among the TRAI, DoT and the TC. Mani (2008) also observed that the TRAI had been reduced to a tariff-setting body empowered only to fix tariffs and inter-connection charges and set norms on quality of service.

Cha et al. (2008) observed that an increasingly wide range of services is becoming available in the telecommunication market in South Korea. So, a price reduction of one service can affect individual-level usage for other services. A mobile service provider should segment the market so that the revenue loss is minimized due to price reduction. Studies (Mani 2008, Mehta 2017) observed that the tariff rates for mobile services were the cheapest in India. In an empirical study, Gupta (2009) found that price was a significant factor in selecting the telecom service provider in the case of India.

The entry of R-Jio transformed the competitive landscape of the industry in India (Kathuria et al. 2019). Leverage levels for most firms increased, and bank exposure to the telecom sector was Rs.906 billion as of November 30, 2018. R-Jio opened up a new data-driven industry (Joy and Bahl, 2018). According to Guha Thakurta (2016), Bhatia and Palepu (2016) R-Jio's entry was through predatory behaviour. Whether its pricing is predatory, depends on the steps taken by the regulatory authority.

4. Methodology

In this paper, we have analyzed the performance of a telecom operator based on empirical data. Data are mainly collected from the Annual Reports of the Aircel and TRAI of various years. We have collected data for the period 2013-2019, since the purpose of the study is to examine the impact of entry of R-Jio on the performance of Aircel.

5. Entry of R-Jio into the Indian telecom sector

In June 2010, Reliance Industries (RIL) bought a 95% stake in an unlisted company, namely Infotel Broadband Services Limited (IBSL), for ₹4,800 crore (US\$690 million). In June 2013,

the Telecom Commission cleared a proposal of Reliance to allow 4G-licence holders also to offer voice calling services, amid protest from some existing mobile operators. So far, telecom service providers with 4G licenses were allowed to provide high-speed internet services only on mobile. R-Jio was granted a pan-India license for providing voice telephony along with 4G data service by paying a fee of ₹1658 crore (US\$24 million). R-Jio is the only company that holds pan-India 4G permits.

R-Jio was the first beneficiary of this scheme as it converted its (Internet Service Provider) ISP license to provide voice and data services under the Unified License (UL). R-Jio was granted the UL to provide voice and data services in October 2013, and the company had paid an entry and migration fee only. The “draft” CAG report noted that the total loss to the exchequer was estimated at ₹22,842 crore as Reliance had acquired the 4G spectrum at a price far lower than what its competitors had paid for 3G auctions conducted in 2010 [6].

R-Jio kicked off “test trials” of its 4G services from May 2016 by giving out SIM (Subscriber Identification Module) cards to only its employees and their friends and families. It provided 4G and voice services using VoLTE (Voice over Long Term Evolution) technology. VoLTE technology-enabled high-definition voice and high-speed internet access (Mondal and Singh 2020). By the end of August 2016, the company had anywhere between 2.5 to 3 million users without officially launching commercial operations. During the offer period, all usage was free to the subscribers. The incumbent telecom lobby – (Airtel and Vodafone Idea) complained that Reliance’s “extensive field trials” were a meticulous plan to grab a chunk of users before officially launching commercial operations. A commercial launch would entail license payments to the government as well as strict adherence to several regulatory requirements (quality of service and others), which were not applicable during the extended trial phase.

The telecom regulator TRAI reached out to the Department of Telecommunications (DOT), asking for clarification on how long an operator’s test trials could go on. Almost after a month, the department formally wrote back to TRAI in the first week of September 2016, asking it to issue recommendations on the matter. On May 1, 2017 – nine months after the DoT asked TRAI to look into the issue – the telecom regulator floated a consultation paper on ‘Network Testing before Commercial Launch of Services’. On December 4, 2017, TRAI recommended that there should be “a limit of 90 days” on how long a test phase involving test subscribers should last. R-Jio started an employee referral programme for SIMs (where employees could invite up to ten friends) in May 2016 and started commercial operations from September 5, 2016 – a total of 120 days, without violating any guidelines. This essentially means that if

TRAI's recommendations were in effect before the launch of R-Jio, its four-month test trial period would not have been allowed. This behavior of TRAI was interpreted as a "classic case of regulatory arbitrage" [7].

In September 2016, the company announced its 'Welcome Offer' – a three-month period of free voice and data services. By February 2017, the number of subscribers for R- Jio had crossed 100 million i.e., 170 days after its launch on September 5, 2016. This implied that the company had added on an average of seven customers every single second. People who had connectivity with other service providers did not mind having another free service from R-Jio. After taking R-Jio SIM most of them started availing free service avoiding earlier paid service, resulting in significant loss of revenue for incumbents. As a result, the number of subscribers for the incumbent service providers did not decline, while there was a significant increase in the customer base for R-Jio (Kathuria et al. 2019).

With the 'Welcome Offer' package coming to an end, R- Jio announced another round of extension of free data and voice services through a new 'Happy New Year (HNY) offer' for almost four months i.e. from December 04, 2016 to March 31,2017. As per the existing rule, the validity of the promotional package offered to customers was a maximum of 90 days from the date of launch. Representations were given both by Cellular Operator Association of India (COAI) and R-Jio to TRAI. TRAI referred it to the then Attorney General for guidance although the setting and governing of tariffs is entirely in the regulator's domain. The Attorney General, in his reply dated January 27, 2017 stated that it was perfectly fine for telecom operators to offer separate promotional packages in quick succession.

The third promotional offer, called 'Summer Surprise', was launched in which R-Jio waived off monthly charges for its customers for three months from July 2017 onwards if they purchased any R-Jio plan starting from ₹303. TRAI advised R-Jio to withdraw this offer as the offer was not a promotional offer but rather a plan with special benefits. When R-Jio entered the telecom sector of India, the voice market was almost saturated, so the company's strategy was to focus on the data business aggressively as this business had the potential for very high growth (Kumar, 2017). R-Jio also offered Jio feature phones at a low cost with the latest technology of 4G (Joy and Bahl, 2018; Rishi, 2018).

6. Impact of entry of R-Jio on Aircel

Aircel Ltd. an Indian mobile network operator headquartered in Mumbai used to provide voice, and 2G and 3G data services. Maxis Communications, a Malaysian-based company, held a 74 percent stake and Sindya Securities and Investments held the remaining 26

percent. It was a market leader (more than 60 percent of market share) in Tamil Nadu , and a major player in Odisha, Assam, and North-East telecom circles[8].

It can be observed from Table 1 that Aircel was able to increase its customer base every year till 2016-17. Its customer base declined by 16.75 million between 2016-17 and 2017-18 after the entry of R-Jio in September 2016. Other telecom operators such as Reliance Communication, Tata Teleservices, Telenor, and MTNL also experienced a decline in customer base between 2016-17 and 2017-18. Wireless subscriber base recorded a decrease of 21.60 million between 2017-18 and 2018-19. During 2018-19, 57.57 million subscribers submitted their porting requests for availing Mobile Number Portability (MNP) facility, which implies that subscribers were exercising their preference for service providers (Annual Report, 2018-19, TRAI).

It can be observed from Figure 1 that the growth rate of revenue for Aircel was higher than the average growth rate of the industry as a whole every year barring 2013-14. Since telecom is a capital - intensive industry, it is mostly financed through debt. So, the Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) is a useful indicator for measuring the operational viability of a telecom operator [9]. EBITDA margins of Aircel were higher than the industry average every year between 2011-12 and 2015-16 (Figure 2).

Table 1

Subscriber base of Wireless Services from 2013-14 to 2018-19

(Subscribers in million)

Service providers	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Bharti Airtel	205.39	226.02	251.24	273.65	304.19	325.18
Vodafone Idea	166.56	183.80	197.95	209.06	222.70	394.84 [^]
Idea	135.79	157.81	157.07	195.37	211.21	
Reliance Communication	110.89	109.47	102.41	83.50	0.19	0.02
BSNL	94.65	77.22	86.35	100.99	111.68	115.74
Aircel#	70.15	81.40	87.091	90.90	74.15	
Reliance Jio*				108.68	186.56	306.72
Tata Teleservices	63	66.32	60.10	48.99	31.19	15.85
Telenor@	35.61	45.62	52.45	50.49	37.98	
Systema**	9.04	8.86	7.69	4.91		
Videocon@@	4.99	7.13	6.56			
MTNL@@@	3.37	3.51	3.56	3.63	3.56	3.45
Loop##	2.9					
Quadrant@@	2.17	2.73	3.16			
Total	904.51	969.89	1033.63	1170.18	1183.41	1161.81

#Aircel filed for bankruptcy in April 2018 in National Company Law Tribunal (NCLT) and stopped providing services

*Reliance Jio launched its services in 2016

@Telenor merged with Airtel with effect from May 2018

**Services of Systema were taken over by RCom/RTL since 2017-18

@@Videocon and Quadrant discontinued their services from 2016-17

@@@ MTNL is a wholly-owned subsidiary of BSNL. MTNL provides services in the metro cities of Mumbai and New Delhi in India.

Loop discontinued services since 2014

Source : Annual Report, TRAI (various issues)

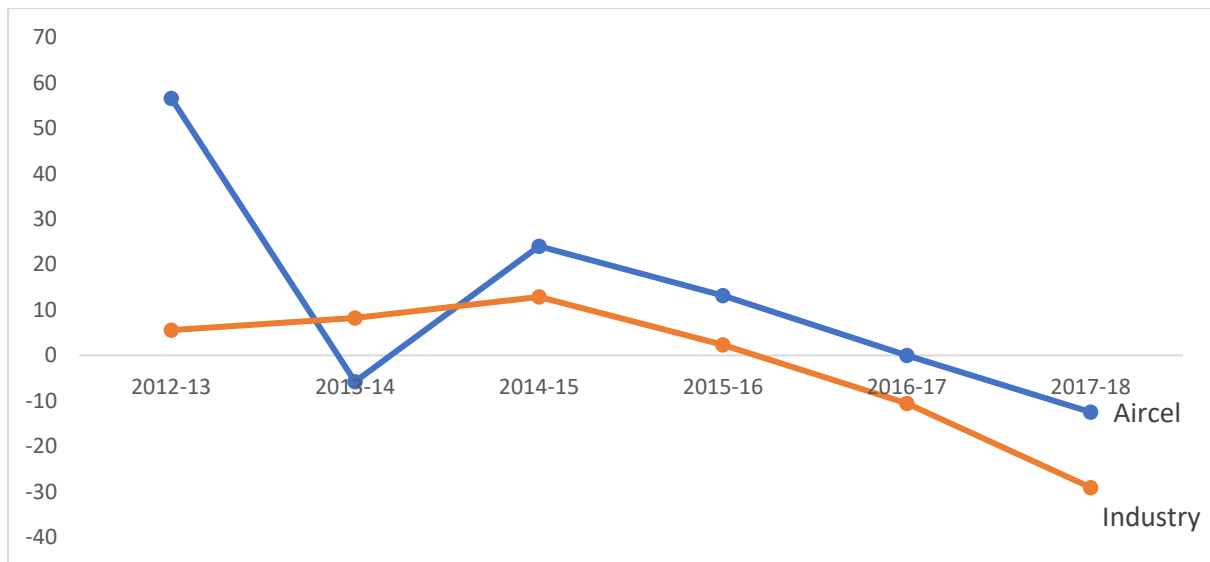


Figure 1: Growth Trends in Revenue: Aircel and Industry

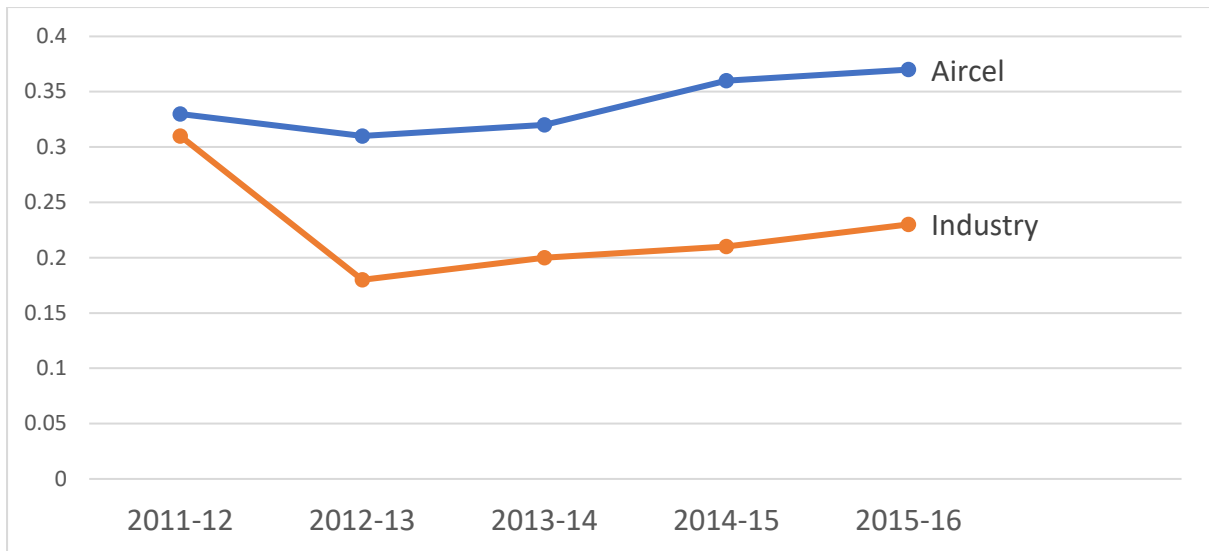


Figure 2: EBITDA Margin: Aircel and Industry

The company tried to increase revenue by acquiring new customers, offering new plans, and sharing resource with its partner operators. The company was trying to reduce operational costs through optimum utilization of the existing resources. Figure 3 indicates the effort made by Aircel to bring down operating expenses (OPEX) against target (i.e. Annual Operating Plan) as operating expense was always below the budgeted amount. In a situation of fierce price competition after the entry of R-Jio, Aircel undertook cost-saving measures to improve its Earnings before Interest and Taxes (EBIT). The saving of EBIT with respect to the Annual Operating Plan (AOP) is shown in Figure 4. Aircel was successful in keeping operating expenses below its target to improve EBIT. Aircel closed down non-profitable branches for the sake of reducing operating expenses.

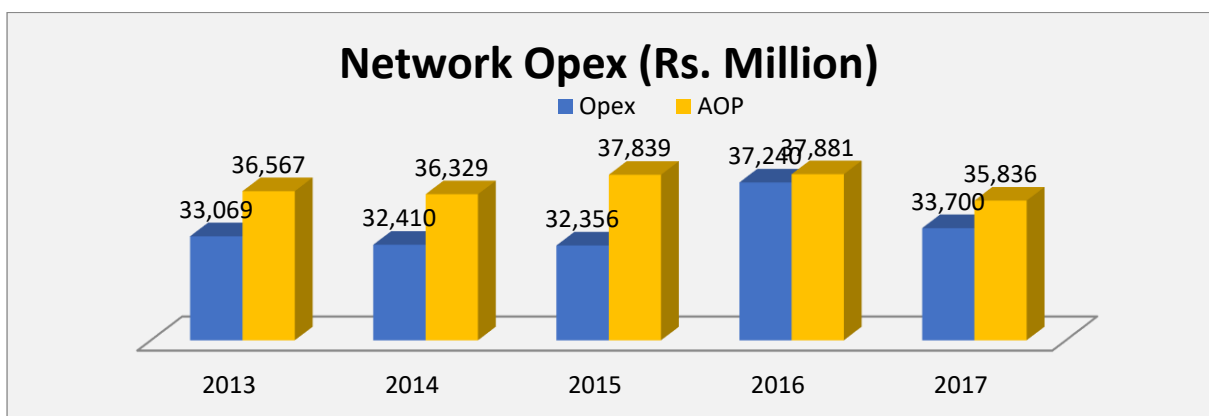


Figure 3 : Network Operating expenses (Opex) vs. AOP (Annual Operating Plan – Target)

Source : Annual Report, Aircel

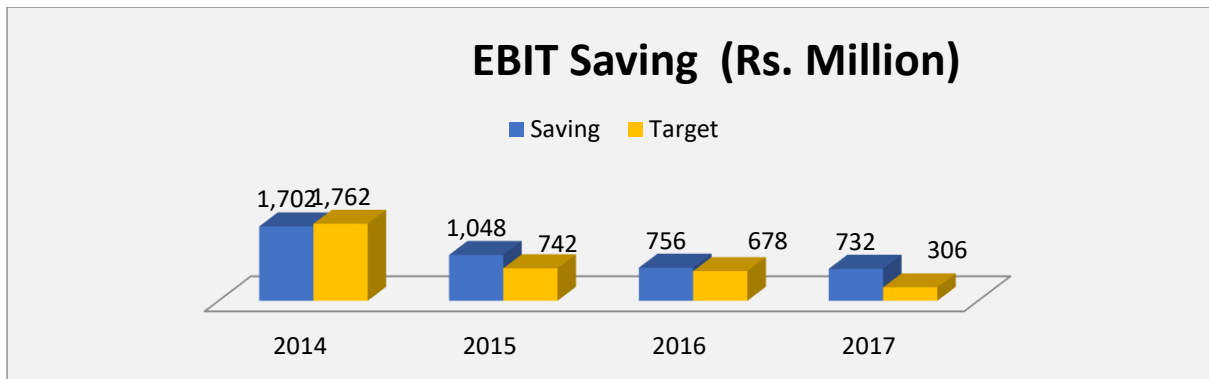


Figure 4: EBIT Saving Vs Target

Source: Annual Report, Aircel

The EBIT saving plan was broken into segments like rent, energy, including fuel and electricity, Operation and Maintenance (O&M), Annual Maintenance Contract (AMC), Managed Services Contract (MSC) / Basic Services Contract (BSC), which contributed to major operating cost (Figure 5). Each segment had a clear - cut saving target to meet. All out efforts were made to achieve the saving targets to keep the Aircel business viable. The company undertook measures to reduce operating expenses; as Figure 6 shows, the company tried to keep rent, diesel, and electricity charges per site under control.

(Rs.Million)

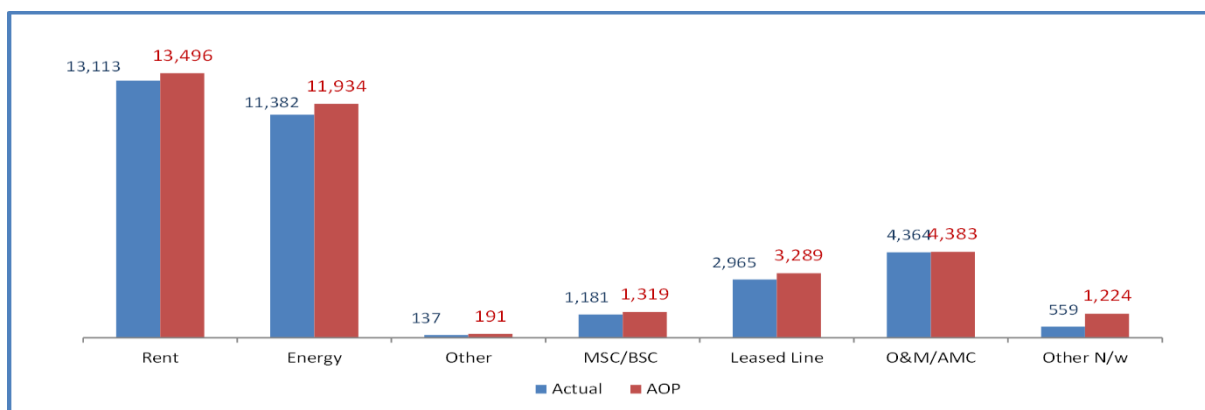
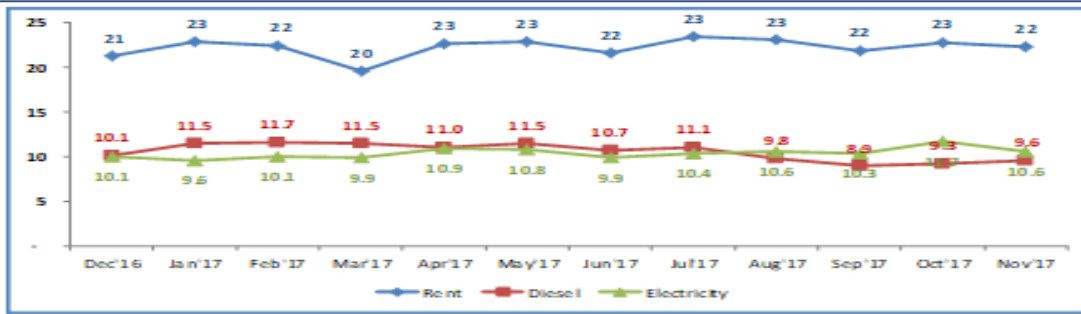


Figure 5: Item-wise Break-up of EBIT Saving Against Target – 2017

Per Site Cost / Last 12 months Trend



Rs. '000



2G sites	50,307	50,271	50,129	50,129	49,082	49,032	48,934	48,885	48,814	48,794	48,794	48,662
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- Note:
- The above cost are on the Actuals.
- Rent does not include CHIL/GIL IP fees for ESA/NSA sites. However site count includes ESA/NSA site count.

Company Confidential

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Figure 6: Month-wise Cost Saving Effort – 2017

Source: Annual Report, Aircel

Table 2 shows that Aircel incurred loss (PBIT) every year, but it could reduce loss during 2012-15 by a considerable amount. However, the amount of loss increased again in the year 2015-16 due to an increase in interest payment. The company was successful in reducing interest payments as a percentage of its revenue between 2012-13 and 2014-15 [Column 6 of Table 2].

It can be observed from Figure 7 that the interest coverage ratio was negative for Aircel and the industry as a whole every year during 2011- 17 since EBIT was negative. The interest coverage ratio indicates the ability of a company to meet its interest payments on outstanding debt. This ratio is calculated as the ratio of Earnings before Interest and Taxes (EBIT) to Financing Costs. The situation worsened for the industry between 2015-16 and 2016-17 after the entry of R-Jio into the market. The interest coverage ratio for Aircel, although negative, was better than the industry average every year. The then Chairperson of State Bank of India and even then Secretary, DoT, expressed concern over the poor financial health of the telecom sector (Guha Thakurta, 2017). The poor financial condition of the industry was likely to have an adverse impact on the banking sector as the banks had an exposure of ₹906 billion (\$ 13 billion) in the telecom sector (Kathuria et al., 2019).

Table 2

PBIT, PBT, Revenue and Interest Payments of Aircel

Year	PBIT (Rs. Crores)	PBT (Rs. Crores)	Interest Payments (Rs. Crores)	Revenue (Rs. Crores)	Interest payments as percentage of Revenue
(1)	(2)	(3)	(4) = (2) – (3)	(5)	(6)
2011-12	-1696	-3237	1541	3023	50.98
2012-13	-2787	-6855	4068	4735	85.91
2013-14	-802	-3478	2676	4461	59.99
2014-15	-48	-1451	1403	5534	25.35
2015-16	-1272	-2961	1689	6262	26.97

Note : PBIT : Profit before Interest and Tax

PBT : Profit Before Tax

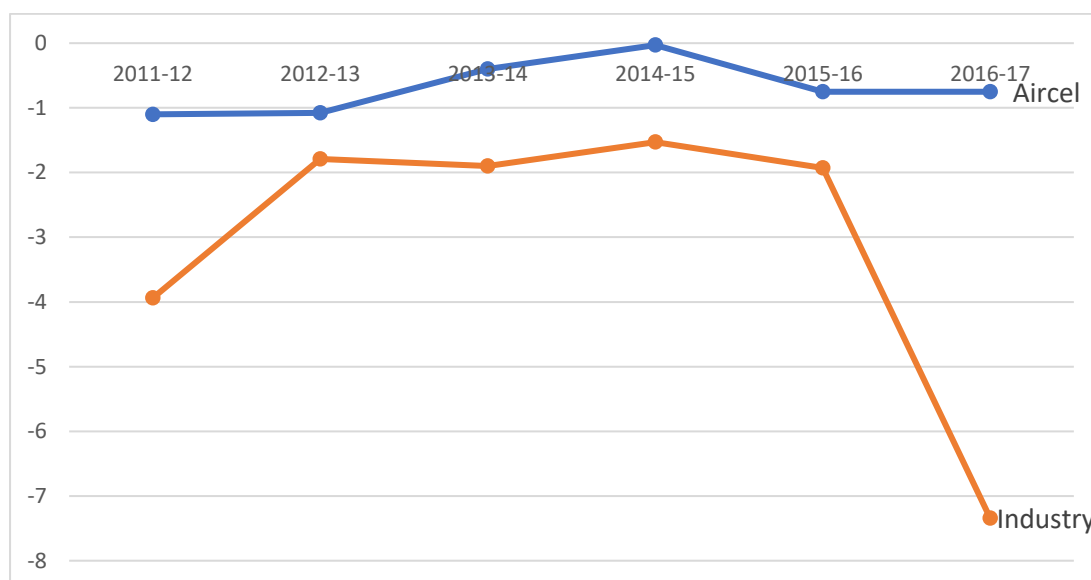


Figure 7: Interest Coverage Ratio

Return on capital employed (ROCE) measures a company's ability to utilize all available capital to generate additional profits. ROCE is measured as the ratio of EBIT to the difference between Total Assets Less Current Liabilities. ROCE was negative for Aircel and also for the whole industry every year during 2011-17 (Figure 8). ROCE deteriorated for Aircel between 2011-12 and 2012-13, then it improved till the year 2014-15 then it again declined between 2014-15 and 2015-16. On the other side, ROCE improved steadily for the industry as a whole between 2011-12 and 2014-15, but there was a sharp decline in ROCE between 2016-17 and 2017-18 after the entry of R-Jio in the market. The interest coverage ratio and ROCE worsened

for the industry between 2015-16 and 2016-17, but both the indicators were almost unchanged for Aircel.

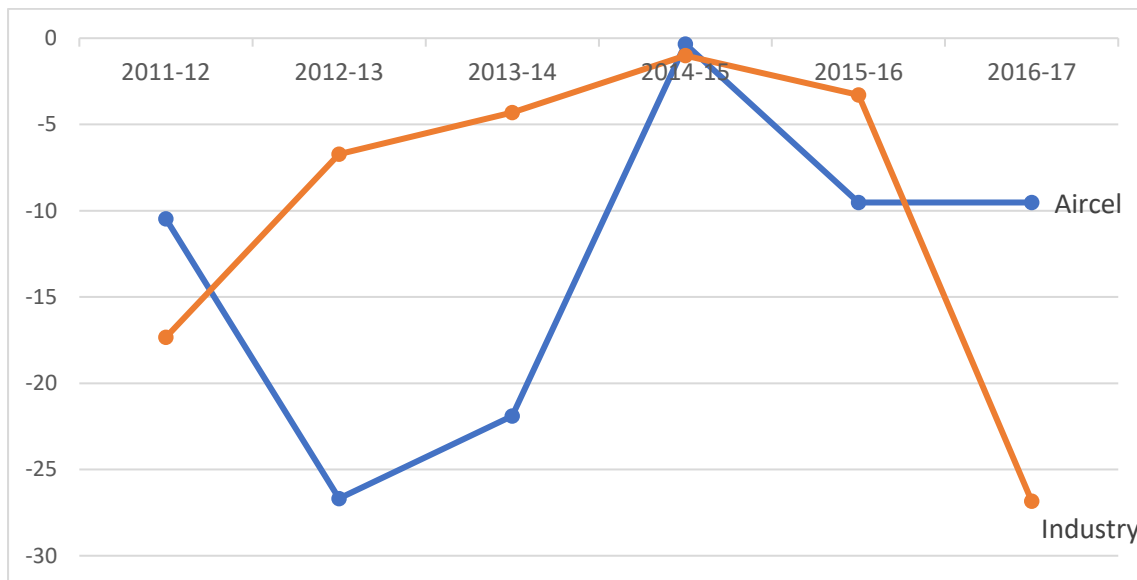


Figure 8: Return on Capital Employed (ROCE)

In April 2015, Aircel re-launched its service in Kerala, and in September 2016, Reliance Communications and Aircel announced the merger of their mobile network operations. Following the merger, the joint entity was expected to become India's fourth-largest telecom operator in terms of consumer base and revenues. A year later, both the companies called off the deal citing regulatory and legal issues [10].

After the failed merger plan, Aircel had planned to shut down its operations in unprofitable circles, including, Gujarat, Maharashtra, Haryana, Himachal Pradesh, Madhya Pradesh, and Uttar Pradesh (West) from 30 January 2018. TRAI asked Aircel to report the number of subscribers who have ported out from Aircel in these six circles. In cases where the porting process could not be completed, TRAI asked the reasons for it. At the end of December 2017, Aircel was under debt of around ₹16,000 crore (US\$2.3 billion) and had 89 million customers across India. Aircel the fifth largest operator with almost 10 percent of the total subscriber base, filed for bankruptcy in March 2018. Subsequently, Reliance Communication also filed for bankruptcy in February 2019. Tata Teleservices Limited (TTSL) decided to exit the market, and it sold its business to Airtel. Vodafone merged with Idea in a \$23 billion deal. The value of the Herfindahl-Hirschman (HH) index, which is used to measure the market structure (i.e., the share of subscribers), increased from 1608 in 2009 to 2791 in 2019 [11]. The increase in the value of HH index implies that there has been consolidation in India's telecom sector after

the entry of R-Jio. There were 14 operators providing telecom services in the year 2013-14 (Table 1). At present, there are only three major operators namely, Bharti Airtel, Vodafone Idea, R-Jio, and a public sector company BSNL. So, there has been a transformation in the market structure from competition to oligopoly.

Apart from Aircel, and other smaller telecom operators, the entry of R-Jio also had an impact on the financial performances of major telecom operators namely, Bharti Airtel, Vodafone Idea, and BSNL. In 2015-16, the combined market share of these companies was 67.44 per cent. It can be observed from Figure 9 that these companies recorded a decline in sales turnover after the entry of R-Jio. R-Jio experienced a steep increase in sales turnover, becoming the largest telecom company in India in 2020-21. The market share of R-Jio is 33.47 percent, followed by Bharti Airtel 28.31 percent, Vodafone Idea 27.57 percent, and BSNL 10.35 percent as on March 31, 2020 (Annual Report, 2019-20, TRAI). R-Jio has the highest market share as it has followed the strategy of undercutting the prices for telecom services since the price elasticity of demand for telecommunication services is very high in India (Jain and Sridhar 2003). Figure 10 shows the profitability of telecom companies measured as a percentage of profit after tax to sales turnover. Only R-Jio remains a profitable company, whereas all other competitors have been incurring losses since 2018-19 (Figure 10). The interest burden measured as interest payment as a percentage of sales turnover has increased for all operators since 2017-18, but R-Jio is able to reduce its interest burden drastically between 2019-20 and 2020-21 (Figure 11). There has been a steep increase in the interest to sales turnover ratio for Vodafone Idea as the company is required to pay interest on the deferred payments for spectrum and adjusted gross revenue (AGR) dues. The company's long-term debt has increased to ₹1574 billion from ₹963 billion (i.e., by 63.44 percent) during 2020-21 [Annual Report 2020-21, Vodafone Idea Ltd.]. There was a possibility of the company closing down its operation due to such as large debt burden. In that case, the telecom market in India will virtually become a duopoly with two large operators R-Jio and Bharti Airtel [12] (Sanjai and Saxena 2019). In order to prevent further concentration of the market structure, the union government has announced that it will own 35.8 percent of Vodafone Idea as the company has decided to convert interest on a deferred spectrum and AGR dues into equity. This makes the Union government the single largest shareholder in the company, which is a joint venture between the Aditya Birla group and UK-headquartered Vodafone Idea. However, it has also been announced that this does not amount to nationalization as the management control will remain in private hands, and the government will not interfere in operations [13]. It seems that the

government has undertaken such a unique measure in order to prevent the market from becoming a duopoly.

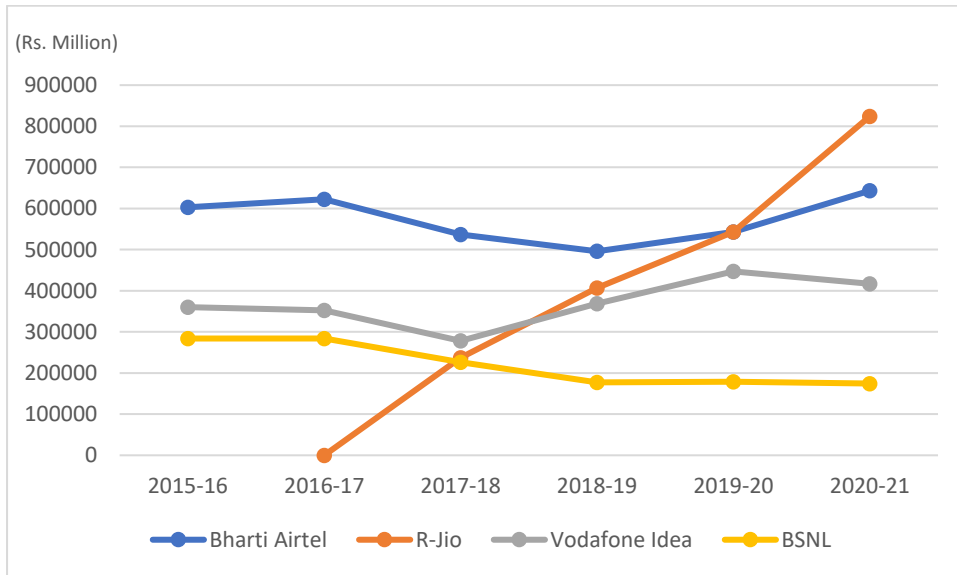


Figure 9: Sales – turnover of Telecom Service Operators

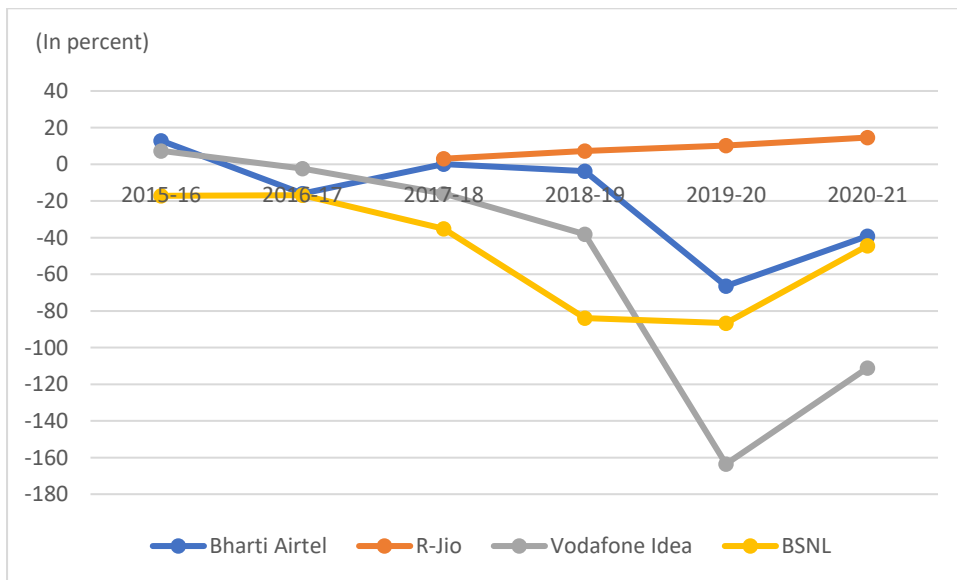


Figure 10: Ratio of Profit after Tax to Sales – Turnover

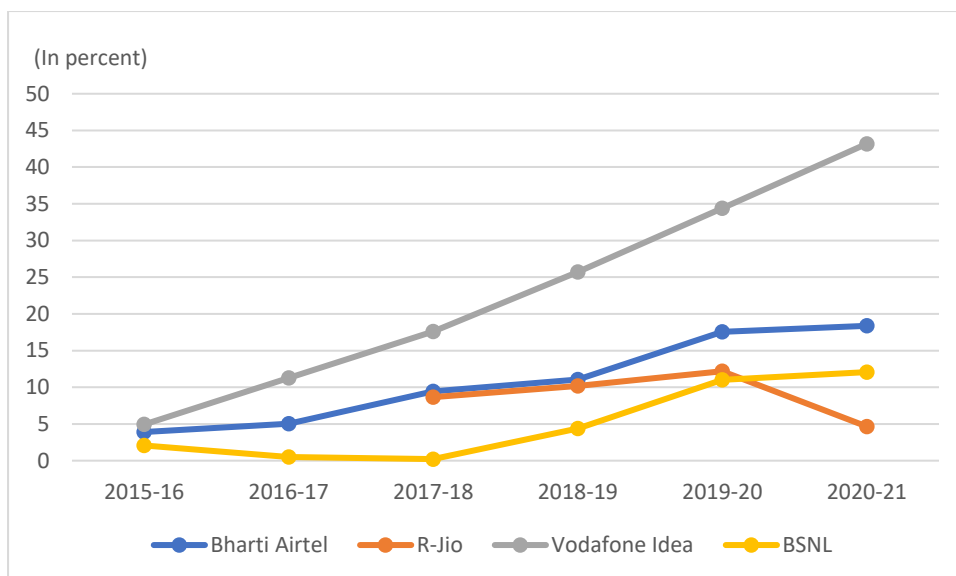


Figure 11: Ratio of Interest to Sales Turnover

7. Conclusion

R-Jio used loopholes in regulatory rules skillfully to become a dominant service provider in the Indian telecom market. R-Jio took the advantage of the absence of clear role clarity among DoT, TRAI, and TC (Hallur and Sane 2018). The entry of R-Jio resulted in steep price competition in the telecom sector of India. Telecom services providers such as Airtel, Tata Teleservices, and other smaller service providers could not withstand the competitive pressures and had to exit the market. Even major telecom operators like Bharti Airtel, Vodafone Idea, BSNL incurred losses, and their interest burden increased drastically. In this process, the market structure has been changed from competition to oligopoly as the value of Herfindhal index has also increased in this sector. This sector witnessed price competition as described in the Bertrand model of oligopoly, where a late entrant can undercut the prices of existing firms and capture a larger share of the market. R-Jio's strategy matched the Bertrand model as its entry into the telecom sector by offering voice call, and data charges free of cost resulted in a price war, as other telecom service providers had to reduce their prices. Monthly ARPU of the sector declined from Rs.118.65 in 2016 to Rs.70.55 in 2018. Although telecom service subscribers benefitted, a telecom operator like Airtel could not withstand the competitive pressure and had to exit from the market. Even larger operators such as Bharti Airtel, Vodafone Idea started incurring losses after 2017-18. These companies could not pay AGR dues. They requested TRAI for the fixation of a floor price on origination, interconnectivity, and termination charges to recover the cost and pay the dues (Annual Report 2019-20, TRAI). But TRAI did not agree to fix a floor price. As a result, Bharti Airtel and Vodafone Idea announced

hikes in their tariff rates. R-Jio, which had initiated the tariff war when it started its operation in September 2016, also announced a hike in tariff to a minimum of Rs.91 (for 28 days) from Rs.75 earlier and a maximum to Rs.2,879 from Rs.2,399 (for 365 days). Vodafone Idea has also increased its minimum tariff from Rs.79 to Rs.99, and maximum to Rs.2,899 from Rs.2,399 in November 2021 [14] Bharti Airtel has also announced a 25 percent hike in the tariff rates applicable to pre-paid customers, who comprise about 95% of Bharti Airtel's total subscriber base [15]. This is also like the Bertrand model, where an increase in prices of close substitutes by one firm leads to an increase in prices by other firms in the market. ARPU (Average Revenue per User per Month) has increased from Rs.97 during July – September, 2020 to Rs.108 during July-September, 2021 [16]. With the hike in the tariff rates by all service providers, it is expected that ARPU of this sector is likely to increase in the foreseeable future. As the number of service providers has been reduced to four, there is a possibility of tacit collusion in terms of the formation of a cartel among them, leading to a further increase in the tariff rates resulting in a loss of welfare for telecom service subscribers.

Notes

[1] Mahanagar Telephone Nigam Limited (MTNL) is a wholly-owned subsidiary of BSNL headquartered in New Delhi, India. MTNL provides services in the metro cities of Mumbai and New Delhi in India and in the island nation of Mauritius in Africa.

[2] Urban tele-density is 156.82 percent, and rural tele-density is 56.71 percent. Annual Report 2019–2020, Department of Telecommunications (DOT), Ministry of Communication and Information Technology, Government of India, New Delhi.

[3] The Herfindahl-Hirschman Index (HHI) measures market concentration and is a metric used to determine market competitiveness.

[4] Access Deficit Charges (ADC) were paid by the private service operators to the public sector company Bharat Sanchar Nigam Limited (BSNL) for using the telecom infrastructure and optic fibre lines established by the government.

[5]The merger between Aircel and Reliance Communication did not materialise, and ultimately, both the companies filed for bankruptcy. The merger between Vodafone and Idea Cellular was successful.

[6]<https://caravanmagazine.in/vantage/4g-19000-crore-mystery-cag-figure-undue-benefit-mukesh-ambanis-reliance-jio-shrank>

[7] <https://thewire.in/tech/reliance-jio-telecom-regulation-trai-anil-ambani>

[8] India has a federal structure with 28 provinces (states) and 8 union territories. Tamil Nadu , Odisha, Assam are states in India.

[9] EBITDA = Net Income + Tax Expense +Interest Expense + Depreciation & Amortization Expense and EBIT = Net Income + Tax Expense +Interest Expense.

[10] The reason given by Reliance Communication was "Inordinate delays caused by legal and regulatory uncertainties, various interventions by vested interests, policy directives impacting bank financing for telecom and changed industry dynamics,"

https://m.economictimes.com/tech/internet/rcom-calls-off-aircel-merger-blames-legal-uncertainties-policy-directives-for-delay/amp_articles/60901981.cms

[11] Market Study on the Telecom Sector in India – Key Findings and Observations, 22nd January , 2021 , Competition Commission of India, New Delhi.

[12] ‘How the Indian Telecom Industry is Heading Towards a Duopoly’ by Sanjai P.R. and R.Saxena, *The Economic Times*, November 01, 2019.

[13] ‘Govt gets largest stake in Voda Idea in rescue package’, in *Business Standard* , Mumbai on January 12, 2022.

[14] ‘Telecom Tariff will continue to go up’ by Ronendra Singh, *Business Line*, New Delhi, on December 29, 2021.

[15] ‘Explained : why has Bharti Airtel hiked tariffs, and who will be impacted?’ by Aashish Aryan, *Indian Express*, December 3, 2021.

[16] The Indian Telephone Services Performance Indicator Report, July-September , 2021, TRAI.

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