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Abstract:

The major aim of the paper is to analyse the efficiency of the Indian Premier League team 2018 by using Data Envelopment Analysis (DAE). The study opts quantitative method and data collected are secondary in nature. The data were sourced from the reliable reports from sports ministry and also by team wise financial reports from their official site. The DAE analysis were calculated by considering total expenses as input variable and output variable in terms of profit, revenues, net run rate and play-offs scores. The obtained result showed that efficiency of the teams were highly correlated with the performance of the teams in IPL season 2018.

Key Words: DAE Analysis, IPL Team 2018, Efficiency, Performance, Sport

1. Introduction:

Financial performance is a process in which how well a firm can use assets from its primary mode of business and to mainly create some revenues out of it. Financial performance is also used as a general measure of a firm's overall financial life within a subjected period. Analysts, investors and all stakeholders use this aspect to compare similar firms across the various industries. As we all know Indian Premier League is the biggest domestic cricket league in the world. IPL's business master stroke is a synergy of entertainment, cricket and financial industry. Starting off with the governing council of IPL i.e. BCCI gives rights to have their own franchises/Teams. Initially Sony signed contract with IPL to buy all media rights for \$1.02b for a ten year period agreeing to pay \$100m every year (Gupta, 2011).

In a nutshell this how money goes from 1 franchise to other franchise during the entire season which also shows us different income segments. Starting with the governing council of Indian premier league (BCCI) gives companies to have their own franchises. The legal entities that have purchased franchise rights have to 12.34% of purchase amount every year to BCCI. (Cricket Info, 2015). This is BCCI's main source of earning. The other sources of income are shared by BCCI and franchise teams in a specific ratio Revenue Stream: Media Rights; Sponsorships; Ticket Sales and miscellaneous

Each and every team has a main sponsor and other associate sponsors. They also sell the merchandise of their dress and kits. BCCI sells the broadcasting rights of the tournament to a channel based on similar bids. For Example. The Broadcasting Rights got sold for 30,000 Crores for 10 years. So, the franchise fees and the money generated through selling the broadcasting rights of the tournament are the main source of income for BCCI. Now talking about franchises per year expenditure, they spend approx. around 60 Crores effectively and efficiently as their franchise fees and 40 crores as players salary. In addition to this the franchise will have to spend on the team's hospitality. Taking a overall figure, the team spends around 120 crores every year. To be a successful franchise the franchise must make more than 120 crores a year. BCCI pays each team approx. 37 crores for the money generated through selling the broadcasting rights of the league.(Mitra, 2010). The franchise also generates revenue through tickets sold at stadium. For every 8 home matches, this comes around 2 crores. The major part of the revenue comes for a franchise is through digital marketing, franchises advertise for enormous and different kinds of brands and earn income. Initially deccan chargers (HYD) had to sell their franchise as they were not able to meet their expected profit from their franchise as the team was not playing good and as a result the sponsors were not willing to pay good amount for their advertisements. This shows the entire process of IPL business based on the facts sourced from the secondary data.

Also, every IPL team has their dedicated sponsors. The sponsors play a vital role in increasing the assets of the IPL owners. The sponsors, who have a deal with each of the franchises, generate a lot of fame for themselves. A lot of inflow of cash is generated from the stadium tickets in an IPL game. The franchises make a lot of income from the tickets that are bought during their subjected "home" game. Also a lot of merchandised products like t-shirts flags, hoodies and souvenirs are sold inside the stadium, with snacks and beverages to go with it. In short and simple, a major portion of all the activities which seen in a stadium goes to the owners of the home team. (Singh and Kaur, 2017)

Every year, the teams of IPL generates money by the player auctions and through swaps. In addition to it the team also makes huge sum of money in the form of championship prize money in case of their winning. For instance, in the year 2016 the winners got prize money worth of rupees twenty crores and the runners-up bagged rupees eleven crores. When it comes to the payment part every team needs to pay the cricket board with certain amount to play their games. The IPL franchises showed the below mentioned series of outflows: To become a owner of any specific franchise the team owner needs to bid the amount of 12% based on their final bid. The players of the team get the salaries from the owner which is also fixed. Based on the key requirements and financial aspects the franchise owner bid for the players for their team. This may be the reason to note that few big players remained unselected by few franchise. Also the expenditures should be covered by the franchise which includes the travel expenses, hotel bookings and other logistics and administrative expenses has to be incurred by the franchise of the teams.

2. Review of Literature:

The Indian Premier League (IPL) was set off by the Board of Control for Cricket India (BCCI) sanctioned by International cricket board. Million dollar transactions are happening every year by IPL. Mainly the corporates and big personalities take the chance of franchising and invest billions of amount in the cricket game. The article also mentioned that the

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IPL is based upon the franchise competition where the franchises own their teams and play the game around and players of each Indian premier league team are chosen through an open auction with individual player being put up for bidding by the franchises and the highest bidder becomes the buyer. State franchisees have been issued for the first three seasons of competition and an expansion to 10 IPL teams took place for the fourth season in the year 2011 (Cricket Info, 2011). Investors are entitled to hold some of the particular shares of IPL teams therefore confronting with the aspects that can be analysed and interpreted and can be studied from the point of view of economics and are using the tool of analysing the statistics provided by the particular discipline and eyes also mention that the financial performance of the IPL teams can be measured or can be approached or can be calculated by using some of the important ways or the important tools which are most commonly used models such as DEA or CCR models (Zhu, 2009). The main objective of these models is to analyse and calculate the technical efficiency of teams in IPL as mentioned above with the total expenses of players which includes the wage bill which of the support staff and other miscellaneous expenses and outputs are measured by using the points awarded on the net run rate of the team and the profit and revenues etc and the author as also mentioned that how the franchises spend their money for the central sponsorship, central broadcasting, team sponsors and revenues from other sources like advertising in the stadiums, entry receipts, promotion sales, prize money and many more after analysing interpreting the financial performance of the teams. It is analysed that in previous IPL games Chennai Super Kings, Mumbai Indians are technically efficient because it reports with greater profits with the minimal expenditure among the Indian premier league teams and similarly Royal challengers Bangalore RCB is very inefficient because of the very low profit and the high expenses in 2014 season in IPL, the article has also mentioned that the owners and in which year the teams were found that is taking 27 Chennai super Kings was founded in the year 2008 and the owner of Chennai super Kings is India cement, the Delhi daredevils was established in the year 2008 and the owners are GMR Group and JSW Group, kings XI Punjab was founded in 2008 and the owners are Preity Zinta, Mohit Burman, Karan Paul, Ness Wadia, Kolkata Knight Riders was established in the year 2008 the owner of this is Shahrukh Khan, Juhi Chawla, Jay Mehta, Mumbai Indians was established in the year 2008 and the owner Reliance Industries, Royal Challengers Bangalore was established in the year 2008 and the current owner is United spirits limited, and Rajasthan Royals was founded in the year 2008 and the owner is Manoj Badale, Sunrisers Hyderabad was established in the year 2012 in the owner is Kalanithi Maran

In the article published by statistics research department July 18th 2018, it stated that the Indian premier league system as firmly established itself as the very most thrilling and the most prestigious T20 in entire world. It has delivered financially for every players franchise sponsors and India as a whole prompting for strong desire amongst very range of stakeholders to understand what it is worth as economic asset and the article has also mentioned about the selection and the hiring process as well as the budget which is generated for hiring the players and the hiring is quite same compared to the American style franchise based system and it also stated that the BCCI in the year 2015 contributed over 11 billion Indian rupees to the GDP of the Indian economy and this made one of the important aspect for our Indian economy to boost out in the GDP. The IPL had highest attendance compared to all cricket league which are there in in the world and was ranked 6th rank by average attendance among every sports league in the year 2014 and this really helped IPL franchise owners to drastically gain the revenue out of this. According to Ajimon Francis and Savio D'Souza (2015), they treated Indian premier league as a single official commercial entity and have aggregated this as the income that both the board of control for cricket in India as well as all the IPL franchises are going to achieve and all the expenditure that are incurred. And there were also stated that the 33.99% as the common rate of tax which must be paid by both BCCI and IPL franchise owners.

And the article has also mentioned that in the year 2016 and 2017 Ipl teams such as Chennai super Kings and Rajasthan royals were banned in IPL and showed how the franchise owners lost name and fame and the financial aspects of the brand and how the franchise owners lost their investments and other financial aspects related to the teams.

Rastogi and Deodhar (2009), also mentioned that how to rank between the franchise or IPL teams such as each brand is assigned as BSI score out of hundred which is felt later into the brand value calculation purpose and based on each code achieved by teams they are been rated between AAA and D in the format which is very similar to a credit rating. AAA+ brands can be stated as the exceptionally strong and well managed and the teams which are not performing well, and which is not stated as exceptionally strong and which are not well managed would be called as a D grade and

Pal (2018), showed some of the statistics of IPL in the year 2017 such as the insights brand value and brand strength index and much more which is really needed to be considered to analyse and evaluate financial performance of the brand franchise owners of IPL. Knight riders have a brand value of 58.6 million US dollars and the fastest growth year to of 24%, this team topped the brand finance of Indian premier league table for 2 years in a row. Mumbai Indians the very most powerful brand among all the franchises of the Indian premier league with the brand strength index (BSI) SCORE of 71 and Mumbai Indians brand value is rated as the second to that of Kolkata Knight riders at 54.1 million dollars, up 17% from the year 2016 and with the impressive growth of around 23% to the brand value of 46.5 million US dollars helped Sunrisers Hyderabad to be in third place undisclosed much more insights of the teams in IPL. Royal challengers Bangalore had brand strength index of 66 in the year 2016 and Royal challengers Bangalore is the only franchise brand whose strength waned during this season and Delhi daredevils had brand value of 40.5 million US dollars and Kings XI Punjab had a brand value of 30 6.2 US dollars million putting its team in the last place in the year 2017 (Prathap, 2018)

Revenues such as minimum value can be considered under so many categories such as ticket sales where the revenue which is earned by selling each ticket will be divided between the two playing teams and Indian premier league organiser and the percentage of amount distribution that is 80 percentage of total stadium tickets will be in the hands of franchises and 20% with IPL organisers and the cash received on the sales of entry passes is one of the major revenue source for franchise and the local sponsorship of the team which all the franchise tries to earn from the different brand available in the market (Saikia and

Bhattacharjee, 2011). The popularity of team will come into picture here as it definitely the most popular team among the population may get more sponsorship compared to other teams and even in the article it is clearly mentioned about the distribution of the prize money such as in a match how the prize money is distributed among the franchise is like the prize money consists of a single digit percentage of the broadcasting rights and Indian premier league sponsorship and the merchandise like selling the T-Shirts and selling the caps through the website or online etc and other channels and this revenue stream can be the big money spinner depending on the fan following of team and yes also mentioned that the franchises player trading that IPL where lots of players will be traded between different franchises each and every year and franchises make a neat general profit from the sale or selling of these players as they charge a premium on the price at which they bought them and then was written about how everyone can add more benefit to the IPL franchise owners like one win in IPL team can benefit to earn more money and if the teams are in the top 4 of the points table they are directly qualified for the champions league and which can help the franchise to earn more benefit compared to other teams (Chaudary and Gupta, 2018)

According to Varun Mukati (2016), it is clearly mentioned that major benefits such as in marketing aspects like all franchise owners have the rights can make the team or the players to go for any kind of advertisements and promotions and the players will do the advertisement without getting any of the money for it from the franchise owners of the specific teams and in other way the money that comes in for advertisement directly go to the franchise and not the players. In the aspect of television broadcasting, the rights has been given for world-wide live coverage and thus for past ten years it costs around one billion US dollars. Further the broadcaster can sell the broadcasting based on geographical location and the money earned can be divided across franchise teams. And in addition the TV channels that are broadcasts the advertisements pays certain payment to the franchise. And this is one of the major reason the franchise insist the teams to play more matches compared to other teams. All the money earned by the BCCI by the advertisement, promotion and broadcasting activities will go to a central pool and from that a sizeable share is given to all the franchise owners of the IPL teams and some share towards prize money as well. Thus IPL is considered to be in competition based on the franchise since it is clear that the franchise own the teams. Initially in 2008 there was eight teams formed and later in 2011 it increased to ten teams. This clears that the commencement of this IPL games by BCCI shows that they created it not only with the entertainment factor but also they create it for profits as the players of the respective teams have greater fame and popular world-wide. And these 10 years of the launch of IPL team competition for paying twenty20, it's the right time to measure the efficiency of the teams in producing profitability for the franchise owner. In a way apart from the entertainment aspects this IPL teams profitability can also be seen from economic view point. Thus this papers attempts to measure the efficiency of the eight IPL teams of season 2018 using mathematical approach Data Envelopment Analysis (Fare et al., 2010; Yousaf et al., 2018; Wilkens and Zhu, 2001; Gattoufi et al., 2004).

3. Research Methodology:

This study attempts to measure the technical efficiency of the IPL 2018 teams. The secondary data was considered for the study. The data were sourced from reliable cricket reports and also team wise financial reports 2018 from the official site. With the sourced data the total expenses (wages for staff, wage bill and miscellaneous expenses) was considered to be the input and the outcome for the study is measured with revenue and profit by considering the net run rate(NRR) and points scored by the teams in IPL 2018. The overall efficiency of the team was measured using Data Envelopment Analysis (DEA). The DEA is a non-mathematical programming method helps to analyse the efficiency of the firms with multiple inputs and as well as with multiple outputs. This measurement of efficiency helps the investors and shareholders for decision making. Using the DAE frontier tool, the efficiency of the IPL team 2018 was calculated.

4. Results and Discussion:

The data in table 1 represents the expenses, revenue, profits from IPL season 2018.

Table 1: Data of IPL team season 2018

Teams	Expenses (lakhs)	Revenue (lakhs)	Profits (Lakhs)	Points	NRR	Brand value (in millions)
Mumbai Indians	27809.72	39327.21	9115.69	18	0.421	113
Chennai Super Kings	26,095.96	41,783.44	11120.3	18	0.131	98
Royal Challengers Bangalore	21,489.10	31,300.00	9,811.00	11	-0.607	98
Delhi Capitals	39,091.69	42,449.92	3358.23	18	0.044	104
Kings XI Punjab	10,843.02	40,411.01	29567.99	12	-0.251	70
Sunrisers Hyderabad	32,986.41	37,825.40	4838.99	12	0.577	43
Kolkata Knight Riders	31,885.31	33,432.45	1547.14	12	0.028	52
Rajasthan Royals	28,345.51	31,324.01	2,978.50	11	-0.449	52

From the Table 1, it can be seen that the few net run rate (NRR) falls to negative values for some teams includes Royal Challengers Bangalore, Kings XI Punjab and Rajasthan Royals. Thus in order to make them measurable the highest NRR points has been considered for DEA analysis.

Table 2: DEA Efficiency Scores with one input and four outputs

Team (DMU No)	Rank According to Points Table	CRS Efficiency	VRS Efficiency	Scale Efficiency	Benchmarks DMU on VRS (weight)
Mumbai Indians (1)	1	1	1	1	3(1)
Chennai Super Kings (2)	2	1	1	1	1(1)

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Royal Challengers Bangalore (3)	8	0.85	1	0.85	5(1)
Delhi Capitals (4)	3	0.72	0.74	0.95	1(0.1),3(0.342),7(0.538)
Kings XI Punjab (5)	6	1	1	1	7(1)
Sunrisers Hyderabad (6)	4	0.83	0.85	0.95	1(0.396),5(0.136),7(0.33)
Kolkata Knight Riders (7)	5	0.90	0.90	1	1(0.012),3(0.125),7(0.751)
Rajasthan Royals (8)	7	0.77	0.84	0.07	1(0.398), 7(0.402)

Table 2 displays the efficiency scores for the IPL have been estimated by using DEA frontier software. Column 1 represents the name of the teams participated in the IPL 2018 and the same as considered as Decision Making Units (DMUs). With respect to points scored by the team, the rank has been enlisted in column 2. The efficiency scores for IPL teams on Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) are shown in column 3 and 4. By using CRS and VRS, scale efficiency has been calculated which is enlisted in column 5.

It is been observed that four IPL teams (Kings XI Punjab, Chennai Super Kings, Royal Challengers Bangalore and Mumbai Indians) are globally technically efficient in terms profit. The Kings XI Punjab and Chennai Super Kings are earned highest with minimum expenditure compared to other IPL teams. On the other hand, Kolkata Knight Riders is inefficient has incurred less profit and high expenses compare to the counter teams. Though KKR not obtain greater field performance, it drives greater value only by field outputs. Similarly, the Rajasthan Royals is inefficient because of its high expenditure with low revenue. Also Kolkota Knight Riders were near to obtain efficient frontier but fail to acquire it. And the resulting data scores between 0.77 and 0.87 of Rajasthan Royals are seems to be far from obtaining efficient frontier, which shows the failure in the field and towards generating revenues for those teams.

While calculating the efficiency of the respective teams on variable return to scale, it can be noted that there was a rise in score. By definition, it can be claimed that teams with greater CRS remains efficient in VRS as well. The efficiency points of 0.90 of KKR on CRS reflects greater efficiency on VRS. This can be obtained because maximum value of revenue as output among other teams makes the team to stay on the efficient frontier driven by VRS. And also this result may be because of the reason variability of managerial skills by franchise owners.

5. Conclusion:

The paper analyses the efficiency of the IPL teams of season 2018 by DEA analysis approach and concludes that among eight IPL teams the four teams includes Chennai Super Kings, Mumbai Indians, Royal challengers Bangalore and Kings XI Punjab obtains greater efficiency in terms of obtaining profit based on incurred expenses. Though study provides the efficiency of the IPL teams by using available major input and output variable data on expenses, revenue and profit in future the stability of the result can be analysed by taking various combination of inputs and outputs.

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