# Applications of operations research in advertising media of fantasy sports

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*Abstract: This paper aims to find out how techniques of operations research can be used by fantasy sport companies to market their products successfully to potential customers. The dawn of the customer-centric approach has left marketing processes like online and viral marketing with several gaps which can be filled using OR techniques. In this paper, the selection of media used for marketing their products to maximise profits under budgetary constraints is being ascertained using simplex linear programming model.*

*Keywords: Operations Research, Fantasy Sports, Advertising, Linear Programming, Simplex Method, Dream 11*

## 1. INTRODUCTION

The incredible popularity of sports amongst the Indian population has contributed to the rapid growth of fantasy sports in India. Using proper advertisement techniques is of increasing importance in fantasy leagues as it has grown from a mere 2 million users in 2016 to 100 million in 2021, in India itself. According to industry experts we are heading towards fantasy leagues becoming a USD 3.7 billion. Fantasy sports generated USD 340 Million in revenues in 2020, a massive increase from the USD 131 Million recorded a year before (Diary, 2021).

The OR technique used in this study is the LPP Simplex method. The simplex method uses slack variables, tableaus, and pivot variables to find an optimal solution for maximisation and minimisation of the objective function required.

With companies on average spending 2-5% of their sales on advertising it is important to use those resources optimally. OR analyses data and finds the channel of media which is of maximum effectiveness using the resources available.

OR would help a company choose the ideal weightage given to the various media channels by choosing who should advertise, how much should you advertise using that channel and helps in determining the target market for the product (Sanishtha Bhatia, Applications of operations research in advertising media, 2018).

Since the introduction of fantasy sports in 2008, with the inaugural season of the Indian Premier League (IPL), it exponentially captured the Indian market by attracting customers and changed the psychology of the people towards the game (Durbashree Bhattacharya, 2020).

The importance of fantasy sports has been increasing year after year as a study showed that fantasy sports participation leads to an increase in the number of games watched on television, this research was conducted using data from the ESPN Sports Poll for the NFL (National Football League) and MLB (Major League Baseball) (Nesbit, 2009) .This increase in viewership would increase the value of advertising spots. Therefore, the use of OR in the marketing of fantasy sports is of paramount importance as it

indirectly increases the amount of money involved in the sport. OR should be used optimally to market fantasy sports as it indirectly benefits the leagues and the teams as well by bringing more viewership into the sport. Techniques involved should be devised carefully to promote the involvement of players in the fantasy leagues as an increase in the number of players leads to an increase in the amount of money involved in the sport.

There has not been any detailed research done on the marketing of fantasy leagues using OR techniques, to ascertain the optimal media channels to be used by the industry. Using LPP Simplex method we came up with a model, where a player in the fantasy sports industry can apply their budgetary constraints to ascertain the optimal allocation of funds between the major advertising medias used.

Firstly, an overview of the industry in India is given which is followed by the literature review we have conducted about this research area. Subsequently the methodology used in this paper and the analysis and findings are given afterwards.

## 2. OVERVIEW OF THE INDUSTRY
### 2.1 FANTASY LEAGUES
Fantasy leagues allow a player to own their own team, they have control over their team and players and each person oversees their team. In the end, points will be given based on players performance in the real match and the person with the best team wins. Several sports leagues realised the true potential of the fantasy sports industry and started to have fantasy leagues of their own. 3rd party fantasy leagues were formed for those who did not want to commit to playing the league for the whole season but were interested only in a few matches of their choice.

Fantasy league owners even gave incentives to winners of leagues to get more involved in these leagues. Companies like Dream 11, MPL, My11Circle gained more popularity once their use was legalised as the supreme court passed a petition that these leagues are a matter of skill and not gambling. They took money to participate in leagues and gave a part of the pool to winners as the users exercise superior knowledge, judgement and attention to play these leagues. It was observed that the element of skill was of paramount importance on the outcome of these leagues, and it was a matter of "mere skill", thus do not fall into the activity of gambling.

Research conducted using a survey of the general people of India, 279 of 588 were real consumers and interested in fantasy sports, ages 18-25 comprised 50% of the group followed by 26-35 forming 30% (Durbashree Bhattacharya, 2020). This proved that students play a major role in the growth of fantasy sports.

## 3. LITERATURE REVIEW
Many researches have been undertaken over years in areas of effective advertising, optimal use of funds and returns on advertising, marketing of fantasy sports and betting market, application of operations research in advertisement media. However, there has been no trace of researches undertaken for applications of operational research in advertising of fantasy sports.

In the marketing of fantasy leagues, there are three major questions, what type of customer to target? how to target them? and what types of advertisements would the potential customer respond to. The first two are operations research problems and the third is a marketing problem. This shows how important the synergy between operations research and marketing in this day and age is.

Research was performed to ascertain why operations research is required in advertising and it proved that with companies spending more and more money on advertising, it has become more important to ensure that an optimal way of using the money to ensure the best return on investment was ascertained (Sanishtha Bhatia, Applications of operations research in advertising media, 2018). The fantasy sports companies need to continuously spend on their advertising because of low product differentiation. Operations research must be used in marketing of fantasy leagues to ensure a more efficient customised advertising which is extremely effective.

Usually, there is a disputed relationship between fantasy sports market and sports betting market. The market stands mostly similar as the product differentiation is minimal and price inelasticity is robust (Hing, 2014). Almost all fantasy leagues for example, Dream11 and MPL for the same sport are identical, just like the sports betting market for example, Betway and Bet365. The striking factor between the two is that the number of bookmakers is increasing, here advertising plays a pivotal role in luring new customers who cannot tell the difference between the several companies in the space (Rompuy, 2015). Leading to an exponential increase in advertising expenditure with the entry of many players in the market.

Research about the appeal of fantasy sports shows that the primary reason for people to play fantasy sports is a sense of community. This can be done by allowing people to play against each other. The second most common reason for men is monetary purposes for they are enticed by the exciting prizes they can win if their team is the best whereas for women is escape (Keane, 2012). The fantasy marketers have recognised this desire of players to feel that they have control and are team owners, thus the advertisers appeal to this desire of people to control their own team (DP Roy, 2007).

The betting marketing industry is very different from all other marketing industries as the product being marketed here is the sport and its outcome rather than the betting itself. (Mullin, 1985). This stands true even in this day and age where marketers have to promote events by appealing to the customers' love for the sport. The fantasy league industry has a symbiotic relationship with the sports marketing industry. The fantasy leagues exist because of the games being played and in turn it helps increase the games

viewership. Fantasy leagues need to be marketed in a similar way to the sport itself, as they promote the same game and in addition customers are appealed when asked to show their skill in building the best team and winning.

Fantasy sports have caused a reduction in fan focus of team performances and a rather increase in fan focus of individual performances (Birch, 2004). Thus, even during the most mundane games there is a growth in the viewership strengthening the value of sponsorships.

A model formed by Danaher and Rust calculates spending on advertising by considering a diminishing return on advertising as it aimed to maximise return on investment (Peter J, 1996).

The main objective of the paper shall focus on using linear programming to ascertain the media channels which fantasy leagues must use to promote their leagues. The factors affecting the selection of media channels would be the cost of advertising using each channel and the return on investment of the channels as well. Hence, the effective utilisation of such factors shall enable formation of optimum allocation.

## 4. METHODOLOGY
The primary question this paper aims to answer is how operations research can be used to improve advertisement campaigns by fantasy leagues. We approximated the average return on investment various advertisement campaigns can generate.

Secondary research was used to ascertain how OR can be used in advertising, and various ROI for advertisement campaigns (Sanishtha Bhatia, Applications of operations research in advertising media, 2018).

Using linear programming, an OR tool we try to establish the best combination of multimedia channels of advertisement to get the best Return on Investment. After finding out the constraints we used the Microsoft excel solver package and the simplex method to solve the problem. It allows us to model real-life problems into mathematical problems represented by linear relationships. Linear programming is being used to formulate an objective function that seeks to minimize the cost of advertising of fantasy sports using each channel and maximize the return on investment of each channel, while allocating funds from the mentioned budget to all the selected media; subject to constraints.

Assumptions of linear programming
1. Conditions of certainty- objectives and constraints once set do not change in the duration of the study.
2. Divisibility- the constraints must be divisible and should be able to take any fractional value because if they don't, there exists an integer programming problem.
3. Non-negative variables- in LPP it is assumed all variables are non-negative.
4. Optimality- the maximum profit or minimum cost answer is always at the corner point of the feasible solution set.
5. Finiteness- there must be a finite number of alternate activities and resource restriction to ensure that an optimal solution is found.

Assumptions while finding the optimal solution in this case:
- Constraints must be identified and considered.
- Decision variable must be pre-defined.

## 5. ANALYSIS AND FINDINGS
### 5.1 LPP Simplex Model
Fantasy sports league is an upcoming industry and mainly focuses its expenditure in marketing via advertising media. This advertising media majorly comprises of: Tv advertisements, social media, Sponsorships and SEO. An objective function is formulated using the LPP Simplex Model which gives the optimum allocation of funds to each advertising media maximising the return on investment with subject to constraints. The total market size of fantasy sports in India, consisting of existing and potential customers, is estimated to be 100 million people. The budget allotted to the advertising of fantasy sports in India through various media channels is INR 5000 crores in a fiscal year. Advisory from a marketing expert of the fantasy league industry was taken into consideration to know the approximate customer acquisition cost per 100 Rs spent and to know the percentage of return on investment through various medias.

**Table 1**

| Means of advertising | Customer acquisition cost (Number of customers per Rs.100) |
|---|---|
| TV advertisements | 3.2 |
| Social media | 2.3 |
| Sponsorships | 1.7 |
| SEO | 1.2 |

**Table 2**

| Means of advertising | Expected ROI (in %) |
|---|---|
| TV advertisements | 14 |
| Social media | 8.4 |
| Sponsorships | 6 |
| SEO | 5.5 |

With respect to the advertisement expenditure pattern of the leading fantasy sports players in the industry and taking note of factors affecting the use of the source of media, the following constraints were known:
Total budget should not exceed INR. 5000 cr.

- TV advertisements should be at least 2750cr.
- Social media and sponsorship should not exceed 40% of the total budget.
- Budget of SEO lies between 750—1500 cr.
- TV and sponsorships should not exceed 75% of total budget

## Subject to maximisation
*Objective function*

$$z = 0.14x_1 + 0.084x_2 + 0.06x_3 + 0.055x_4$$

*Constraints*
Total budgetary constraint- $x_1 + x_2 + x_3 + x_4 \leq 5000\ cr$

- $x_1 \geq 2750$ (TV advertisement constraint)
- $-0.4x_1 + 0.6x_2 + 0.6x_3 - 0.4x_4 \leq 0$ (Social media and sponsorship constraint)
- $750 \leq x_4 \leq 1500$ (SEO constraint)
- $0.25x_1 - 0.75x_2 + 0.25x_3 - 0.75x_4 \leq 0$ (TV and sponsorships constraint)

| Means of advertising | Budget |
|---|---|
| TV advertisements | 3750 |
| Social media | 500 |
| Sponsorships | 0 |
| SEO | 750 |

Using MS Excel LPP Simplex method, the following allocations are formed for the top sources of media used in advertising of fantasy league in considering the constraints. 5000 Cr have been spent according to the above plan and has generated a return on investment of 608.25 Cr through the objective function. Budget allotted to Sponsorships is Nil as there is no constraint with regards to minimum budget which should be allocated to this media.

## 6. EVALUATION
Determining a marketing budget doesn't just involve deciding how much we can spend, but it will also involve dividing up the budget and allocating it in different segments (Gotter, 2018). Such a model can be used for the allocation of budgets towards various different forms of media in order to maximize our return on investment (UKEssays, 2018). The model is beneficial towards re-evaluation of a new plan for changing conditions, this makes it both effective and flexible due to its ability to adapt to different circumstances. It takes into consideration factors such as the costs and returns generated from different sources and then arrives to a feasible solution, therefore making decision making more effective as it considers these quantitative factors.

## 6.1 Limitations and Recommendations
Information about actual return on investment of various fantasy league advertisement campaigns is proprietary information of the companies and varies from campaign to campaign, the constraints about the minimum and maximum amount to be spent also differs. Therefore, this paper uses certain approximations and assumptions which are dynamic and are set as per the business environment. However, by altering the constraints and return on investments as per the given scenario the media-wise allocation can be ascertained.

For further analysis, experts from the fantasy sports industry must be consulted regarding the actual return on investment for various media channels. Media channels can be further divided into subcategories, such as, digital media channels like, SEO and social medias.

## 6.2 Conclusion
Operations Research helps in finding the cost benefitting and optimum alternative solutions using the process of scientific decision making. Using the LPP Simplex method, along with the customer acquisition cost, expected ROI for various means of advertising computed by us and the budgetary constraints followed, we concluded that Tv Advertisements is the most optimal source of advertising as the model had allocated it 3750 Cr funds out of 5000Cr budget. Sponsorships give the least return on investment and thus had been allocated the lowest amount by the model. We can also see that Dream 11, a major player in the fantasy sports industry has withdrawn its sponsorship from IPL for the same reasons. The return on investment of all media channels is 12.16%.

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