**Operations Research 1 Project Report**

**Fantasy Barclays Premier League Weekly Starting Lineup Optimization**

**Objective Overview**

The primary objective of this project is to come up with a model formulation, allowing Fantasy Barclays Premier League users to choose the optimum mix of starting lineup players. Through the use of Excel Solver and Simplex Linear Programming, we are optimizing the drafting of players for maximizing the weekly total score of a team on the fantasy BPL.

**Problem Statement**

With over 700 players across 20 different Barclays Premier League teams, choosing the right mix of 15 players to give you the most points, while not stretching the budget constraints is a difficult task. Similar in its approach to different Fantasy leagues for NHL, NBA and MLB, Fantasy Barclays Premier League is one of the most popular Fantasy Soccer games online with 3 million registered users.

Choosing the perfect match of players for a fantasy team which would result in maximum weekly points, while adhering to the league rules is a stiff competition. Optimization techniques using Simplex Linear Programming would make it easier for users to optimize their best set of starting lineup players on the Fantasy league.

**Formulation Approach**

The process of optimization of Fantasy Barclays Premier League starting lineup begins with the understanding of the rules of the game. A Fantasy League game has certain sets of rules and conditions to which all of the users must abide to.

Given the total number of available fantasy league players at 700, the maximum budget of £100 Million and much more rules as such, formulating the problem at hand efficiently begins with a clear understanding of the constraints of such a Fantasy sport.

**Project Progress**

We are at the stage of our data collection and formulation, where we are preparing our data for easy and efficient analysis using Excel Solver and Simplex Linear programming.

Using the official website of the Barclays Fantasy Premier League and the subsequent data for the 2015-16 season (12 out of 38 games played until now), we are extracting and organizing our data to be easily read and analyzed using Excel Solver.

**Proposed Project Workflow**

A major part of the problem lies in the number of constraints and variables which are approximated to be around 30+ and 700 respectively. Such analysis of large datasets is prohibited in Excel Solver, which limits the number of variables to 200 at any given time. This makes us to organize our data by the different player positions (Goalkeeper, Defender, Midfielder, and Striker) into different Excel spreadsheets.

The analysis of the different positions are done individually and the top players from each of these categories will be called upon into the final Excel spreadsheet for analysis. The player index rating would be used to calculate the efficiency of players, who would return the maximum points in any game week.

The player index we are using for analysis of player efficiency would be calculated by finding the cost per point, from the player’s accrued points until now and his cost in the market. The efficient set of players would be determined from their cost per point, with the player costing the least per point considered into the starting lineup. Below is a flow diagram of the process we’re implementing to obtain the optimized set of fantasy premier league starting lineup.

**Project Milestones**

The entire set of data (700 Players, their accumulated points and Total cost in the market) is extracted from the official website.

Given the limitations of Solver, the most efficient players from each of the four player positions would be extracted into a single Excel spreadsheet of 200 players for the final analysis.

The constraints, variables and objective function are obtained from the official fantasy gameplay rules, which are listed below:

1. The total budget, which must not exceed £100 Million.
2. Squad Size: Total of 15 players (including substitutes)

* 2 Goalkeepers
* 5 Defenders
* 5 Midfielders
* 3 Strikers

1. Not more than 3 players to be selected from a single team.
2. From the total of 15 players, the starting lineup must contain exactly 1 Goalkeeper, at least 3 Defenders, and at least 1 forward at any given point of time.

Using these above constraints and the player index rating, the weekly optimal starting lineup of 11 players will be extracted.

**Team Members and Duties**

Kislay Kumar Rai – Data collection, extraction and preparation for analysis.

Adwait Deshpande – Formulation of problem constraints, variables and objectives.

Vidit Brahmankar – Formulation of problem constraints, variables and objectives.

Nikhil Soman – Final Data optimization using Excel Solver.

NagaShrikanth Ammanabrolu – Final Data optimization using Excel Solver.