

Sports scheduling and managerial aspects: insights for Argentina's National Basketball League

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Abstract. During the last decades, the use of advanced optimization algorithms to generate sports timetables has caught the attention of both academics and practitioners. From a managerial standpoint, the competition's structure and the design of the league's schedule represent key strategic decisions with a direct impact in terms of revenue and other important indicators. Current research is mainly devoted to tackle specific real-world cases and to provide methodological improvements for these particular problems. As a consequence, the literature providing algorithmic comparisons or evaluating the impact of different league structures is rather scarce. Argentina's National Basketball League (LNB) is one of such cases, as it has undergone a major transformation since 2014 (Duran et al., 2019) following a schedule design resembling the National Basketball Association (NBA), the most important league in the world. The new tournament design focuses on minimizing total distance and is tackled by a variant of the Traveling Tournament Problem (TTP), which showed a positive impact in terms of distance traveled in a large country as Argentina. However, focusing on the distance minimization can overlook the business side of the different leagues, only concentrating on logistics efficiency. In this work, we build upon the experience by Duran et al. by considering an alternative league design, with a time constrained structure, concentrating matches in weekends and having a higher number of matchups among teams that are closer to each other. We consider some well known techniques, such as coupled-based tournaments, and revisit some known timetabling models with a new objective function that incorporates the matches interest distribution throughout the tournament and a re-organization of the league, similar to the existing one before 2014. We conduct extensive computational experiments comparing different structures for each season. Evaluating six LNB's seasons, we show that our approach reduces the overall distance traveled in four out of the six seasons, with an average reduction of about 12%. Furthermore, we show that under moderate assumptions regarding stadium attendance our model translates into higher revenue, with increments ranging from 18 to 45 percent depending on the season.

Keywords: sports scheduling · integer programming · tournament design · game importance