

OR CHALLENGES IN MAJOR SPORT EVENTS

Ana Isabel Barros

TNO,
P.O.Box 96864, 2509 JG The Hague, The Netherlands
and
Faculty of Military Sciences, Netherlands Defence Academy,
P.O. Box 10.000, 1780 CA Den Helder, The Netherlands

e-mail: Ana.Barros@tno.nl

ABSTRACT

Although the origins of Operations Research are usually linked to the military, nowadays successful applications in different areas of the society (business, industrial, health sector and sports) can be found. In particular, applications in sports like sport tactics and strategy, scheduling and forecasting have become quite popular in the last decades. A less explored field concerns applications of Operations Research to plan and secure major sport events. This paper discusses different challenging problems related to the organization of major sport events.

KEYWORDS: Operations Research, Sports

Main area: OA - Other applications in OR, MP- Mathematical Programming

EXTENDED ABSTRACT

Traditionally, Operations Research (OR) focused on military, industry and business applications. As shown by Wright (2009) several interesting applications of OR can also be found in sports. For instance, Sheng (2010) presented a game theoretical approach to analyze strategic interactions between two candidate countries in bidding for the hosting rights of a major sport event, such as the Olympics.

The increasing number of OR applications in sports can be partially explained by the fact that business goes hand in hand with sports due to bets, transfer of players, huge incomes from marketing and broadcasting rights as mentioned by Boon and Sierksma (2004). On the other hand, the increasing sports popularity and the huge dimensions of international competitions like the FIFA World Cup and the Olympics pose organizational and security challenges to the OR community.

Planning, execution and event management of major sport events require a holistic approach to structure the complex environment and problem scope, to define the correct processes and interdependences and at the same time to consider the different stakeholders goals. Soft OR techniques like Problem Structuring Methods can provide assistance in identifying the key issues and interdependencies. Moreover, they help creating a shared understanding of the situation and related planning issues. Van Zijderveld (2009) introduced a method to deal with such complex problems, MARVEL¹, that combines elements from Casual Loop Diagrams and Stock Flow Diagrams. This method can, for instance, be used to provide insight into the effects of increasing anti-doping measures at the Olympic games and as such facilitate the discussion among different sports stakeholders.

Given the increase in violence among sports fans it is important to gather intelligence on hooligan networks. The same holds for terrorist cells, since major sport events like Olympics, could be subject to terrorist attacks as mentioned by Galatas (2012). One of the intelligence challenges is understanding the organization of these so-called covert networks. Luckily, as Morselli (2009) shows, social network analysis and its metrics, based on graph theory, provide insights into the structure of covert networks and point out possible opportunities to disrupt such networks.

OR models can also make valuable contributions in the preparation and the actual management of evacuation of sport stadiums triggered by, for instance, terrorist threats. Hamacher et al. (2011) show how OR models can be used to provide insight in evacuation times and apply these models in the Betzenberg, the region containing the Fritz-Walter soccer stadium in Kaiserslautern, Germany. Furthermore, OR models developed for the military (Stamm et al. (2009)) can be used to design an effective defense structure against an air or terrorist attack.

Finally, major sport event attract a large number of foreign visitors worldwide. The question immediately arises on how to deal with this large flow of visitors at the immigration desk without an excessive increase in waiting times. Also, at the event location and its neighborhood, tight security measures are often required. One of the most time-consuming tasks is to manually review identity or club cards. However, this task can be supported with new technology. As Gold (2012) mentions, during the 2012 London Olympics, iris and hand biometrics will play a key role in checking staff and athletes attending the London Olympic Park. But technology alone does not always provide the answer. OR methods can provide insights on how to restructure the control process in order to achieve an effective and efficient use of new technology. Another related challenge concerns the security of the vicinities of sport events. Evers et al. (2012) show how to

¹ Method to Analyze Relations between Variables using Enriched Loops

develop patrol tours in order to ensure simultaneously efficient surveillance of all predetermined possible conflict spots and a quick average reaction time.

The last decades demonstrated that sport provide a wide field of interesting OR applications. On the other hand, the security and organizational issues of major sport events have not yet received much attention in the literature and pose as such new challenges to the OR community.

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