100 - INFORMATION TECHNOLOGY AND SPORTS MANAGEMENT IN SOCCER

NIVIA MARCIA VELHO;
GREGÓRIO VARVAKIS;
ROGÉRIO CID BASTOS.
Programa de Pós-graduação em Engenharia e Gestão do Conhecimento
Universidade Federal de Santa Catarina
Florianópolis - Santa Catarina - Brasil
nivia@cds.ufsc.br

INTRODUCTION

Soccer is, nowadays, recognized as a great business in the world. According to the final report of the Brazilian Soccer Improvement Plan (2000) by Getulio Vargas Foundation, the world soccer compels nearly 250 billion dollars annually.

In Brazil, data from this report shows that soccer is an economic activity with a great capacity to create jobs and it also has a greater multiplying effect than several traditional sectors, accounting for: 300 thousand direct-jobs; 30 million sportists; 580 thousand participants in 13 thousand formal teams; 580 stadiums with the capacity to join 5.5 million people and 500 professional clubs running for about 90 competitions per year.

The main objective of sports organizations and clubs or associations is the obtention of good results in the competitions to which they submit themselves. Thus, it seems to be important to incorporate technological innovations, used in different areas of knowledge, to their business strategies, seeking to adapt themselves to the constant transformations and updates. Some clubs that stand in the national scenario as sports centers of excellence also seek to ally technology to the search of a better performance.

The management of sports organizations and the transparency of their actions are, currently, modern objects of investigations. In this way, the purpose of this study is to describe how information technology interferes in the search for better results in sports, specially, in which soccer is concerned.

METHODOLOGY

This study is a bibliographical research. According to Thomas and Nelson (2002) this kind of research aims to search for information in documents with quality enabling approaches and reflections that provide a support in the subject to be developed.

THEORETICAL REFERENCES

Soccer clubs have found a new ally to improve the performance of their players, avoid injuries and transform the physical and tactical efforts in goals to conquer sports titles, says Turíbio Leite, physiologist of both Brazilian soccer team and Sao Paulo soccer club and also director of the medicine center of physical activities and sports of Federal University of Sao Paulo (UNIFESP), where he coordinates a research that seeks to improve methods of physical recovery for athletes.

For Turibio, the athlete's recovery is as important as his training, especially in which the tight calendar to which soccer clubs are submitted is concerned.

In this study, the team of researches from UNIFESP observed, during the games and for four years, the movements of 100 athletes of Sao Paulo soccer club using simultaneous cameras. The data about the displacement of the athletes demonstrated that the sideways and midfields players are the most demanded ones in terms of resistance and backward runs. Results have, then, enabled the physical coach to respect the individualities of each player in order to improve their performance as well as the teams´. (Available at: http://www.sbpcnet.org.br/ arquivos/).

Sports technologies constantly enable the obtainment, analysis and availability of information about technical and tactics of games which, later, converge to a statistical mapping of passes, dribblings, and the participation of players in field. In Campinas, Sao Paulo, a technology company, in association with Unicamp, is specialized in the training and development of solutions to the sports area as well as in methodologies and softwares that provide statistical data with details about the games. The company also provides a historical and interactive databank so that the user can follow trends and compare performances.

In the American basketball game, for instance, it is common to study the opponents to identify their game features: from displacements up to the most used side of the court. In Brazil, this technology has already been used for tactical analysis in several sports modalities. (Available at: www.comciencia.br/comciencia)

In Germany, 2006, the usage of technology could be observed in the selling of tickets which was carried out, exclusively, through an online system, at FIFA´s official site. The tickets were printed and sent with the name of the purchaser and they could also be transferred in case the person gave up watching the game. To make data transmission to several different locations in Germany easier, the organization discarded a wireless system in favor of cable connection through Ethernet with 1mbps. In the Olympic Stadium of Berlin, for example, there were 3 thousand points to send information. The Soccer World Cup of 2006 had 40 thousand gadgets of access with 45 thousand network connections at a speed of 15 terabytes of data transition during the event. (Available at: cidadedofutebol.uol.com.br).

In field, the teams also used the help of technology to improve their performances during the greatest soccer competition in the planet. In the Brazilin soccer team, for example, the physical coach Moracy San'Anna used statistic software during the game. Moreover, the Brazilian athletes used a sensor in their tennis-shoes and watches during the training sections, which provided data about their physical performance through tables and graphics. (Available at: cidadedofutebol.uol.com.br).

As examples of these software information, which followed the physical coach during the games, there were shots to goal, wrong passes, fouls either received or committed, bottom-line crossings, the way the goals were scored whether through individual or articulated moves by several players or from free kicks, head game, using the left or right foot and the length of time with possession of the ball to both sides. (Braun and Felitti, 2006).

The authors also reported that Moracy San'Anna has been using this technology in the evaluation and physical training of players for about 15 years now. Some of the resources (Braun e Felitti, 2006) that are used by the Technical Commission of the team to provide data for the coach are: treadmills attached to computers for aerobic evaluation, GPS (Global Positioning System) gadgets to measure players speed and softwares to enable a heavy defense marking over each player of the match.

In this sense, Hoesch (2006) reports some examples of the last World Cup from the game Germany X Argentina.

During the game, the German goal keeper received, a few moments before the penalties shootout, a probabilistic mapping - based on association and classification rules - about the Argentinean players who would be responsible for the shootouts. The German keeper defended two of them and his team won the game. To generate this analysis, the data was collected through the last years, revealing features and trends of each Argentinean player who scored the penalties, such as: side choice, shootout intensity and ball's average height.

Another example reported by the author comes from Brazil X France match. The French players collected several data from Brazil such as: the average number of passes per game, the average time each player kept possession of the ball and the average speed of the ball in a set of passes. They knew, for example, that the French striker Henry could surmount the Brazilian defender Cafu in more than 3km/h in the peaks.

In the end of the 1998 World Cup, through techniques of grouping and data association, France used what these numbers revealed. For example: a high percentage of Brazilian goals in which there was a participation of the sideways showed that they created the moves or touched the ball in a decisive way, not only in the goals but also when Brazil dominated the midfield actions.

Since the beginning of that final match in the 98 World Cup, the Brazilian team presented difficulties to start moving, while the French team had a strong and innovative marking over the Brazilian sideways. This reflected a thoughtful strategy by the French team, compelling Brazil to change his game pattern. Another situation was that of a mapping of the French team which pointed out a strong tendency that the main and tallest Brazilian players would be concentrated in the most known French head ones and that Zidane would probably be marked by a shorter player. As a result, Zidane scored two goals over the Brazilian team. (Hoesch, 2006).

Thus, it seems to be evident that strategic studies, data mining, pattern recognition, grouping techniques and association of information would again be put into field by the French team in the Germany World Cup. In the 2006 game, France had enough of a good soccer to enable its technical abilities to create a decisive differential and, as it was observed, they demonstrated a competitive strategy laboratory. In terms of technological development and strategic management knowledge, there is no possibility to talk about “luck” or “magic”, because it is a honest work and which provides correct results.

Even though knowing that the French and German Federations use IT systems to collect and analyze data, it is known that no technology works alone. If it was like that, technologically advanced countries such as USA and Japan would have already won the World Cup several times. On the other hand, it is also known that the adequate usage of technological abilities can improve results and competitive behaviors, organize actions and define strategies which can generate victories if efficiently implemented. (Hoesch, 2006).

Another aspect to be considered concerns the athletes' recovery from injuries and, within this context, nanotechnology, which can be defined as the capacity to manipulate atoms and molecules to get new qualities to old products, has enabled a wide range of almost endless possibilities of applications. (http://pt.wikipedia.org).

Through the usage of nanotechnology, scientists have developed an intelligent piece of clothe to monitor the health of patients and athletes who are recovering from injuries. It is produced with a special fabric in which nanosensors are attached and designed to monitor body fluids like blood and sweat. The first version of the embedded sensor in the fabric will be able to measure one's acidity, salinity and transpiration rate through the sweat. It will almost be possible to follow the athlete online and observe his evolution while the treatment is carried out. This piece of clothe is called Biotex and it was designed to be comfortable and used during physiotherapy exercises and physical evaluations.

Biotex, which has the capacity to evaluate the athletes' condition during their recovery, is one of the benefits that nanotechnology can provide to sport. Great companies of the segment such as Nike and Wilson usually spend millions of dollars to develop products that use nanotechnology. Thus, the sports uniforms are now lighter and more comfortable and, according to each sports modality, they can present low resistance to the wind action, repel water and provide thermal functions. Nike itself has a design of uniforms called Nike Sphere-dry which consists on pieces of clothes that use a tri-dimensional technology. They produce air bubbles that reduce the friction of the material with other surfaces avoiding, for example, that the T-shirt “glues” in the body due to the sweat (Available at: cidadedofutebol.uol.com.br).

Kappa is another company that invests in this segment. This year, during textile events in Brazil, the company showed a new sports line with a fabric that has nanosilver particles. It has antimicrobian properties, which guarantees a greater durability to the product.

Regarding tennis, the rackets have also been developed through the usage of nanotechnology which offers lightness and accuracy to the player. In swimming, Speedo recently released, during the Olympics in Athens, the Fast Skin also known as “shark skin”. It was developed to diminish the friction of the body with the water during the competitions and it means a lot to a sport in which millesimals are important. (Available at: cidadedofutebol.uol.com.br).

FINAL REMARKS

The purpose of this study was to demonstrate how information technology can be an ally to the decision-making process of the sports managers in clubs and associations linked to soccer. Thus, it is possible to conclude that: quantitative data about the technical and tactical performance of athletes are essential to the decision-making process in technical commissions during the planning phase of training and in the definition of strategies to be adopted regarding the position of the teams in the field, as well as in the changes defined within the match. Technological resources, when adequately used, can result in a performance improvement of athletes in training and during competitions as well. They are also efficient in the identification of problems, anticipation of solutions, athletes' recovery and to improve the already defined abilities. In sports events, such as the last World Cup editions followed by the entire world through the usage of advanced technological approaches, some situations have come to be evident such as the contributions of technology to the setting of journalistic coverage, safety of audience and scope of broadcastings as well as its importance to the final score reached by the teams in some matches.

BIBLIOGRAPHICAL REFERENCES

ALBERTIN, Alberto Luiz. Valor estratégico dos projetos de tecnologia de informação. ***Revista de Administração de Enpresas*** *São Paulo*, vol.41, no.3 p.42-50. jul./set.2001.

Alvim, Paulo César Rezende de Carvalho. **O papel da informação no processo de capacitação tecnológica das micro e pequenas empresas**. *Ci. Inf.*, 1998, vol.27, no.1, p.0-0. ISSN 0100-1965.

BRAUN, D. e FELITTI,G. Tecnologia refina futebol arte da Seleção Brasileira. Disponível em: http://idgnow.uol.com.br/computaçao_pessoal/ Acesso em 1/05/2007

CORREIA, J.C. Media, desporto e identidades: percurso de análise. **Revista Media & Jornalismo**. n. 4, 3, 2004.

Do laboratório para os campos de Futebol http://www.sbpcnet.org.br/arquivos/arquivo115.pdf. Acesso em

01/05/2007
FALCO, A. **Por trás do jogo: tecnologia colabora para melhorar técnica e tática.** Revista eletrônica de jornalismo científico. Disponível em www.comciencia.br/comciencia. acesso em 27/06/2007.
HOESCH, H. C. **Soccer Intelligence Informação, tecnologia e Soberania**: a trilogia do poder. IJURIS - Instituto de Governo Eletrônico, Inteligência Jurídica e Sistemas. Disponível em: **http://www.ijuris.org/** blog 2006/07tecnologia e futebol. Acesso em 28 de junho de 2007.
LEONCINE, M.P. e DA SILVA, M.T. Entendendo o futebol como um negócio: um estudo exploratório. Disponível em: http://www.scielo.br/scielo.php. Acesso em 15/10/2006.
MAGUIRE, J. Pontos e questões chave do complexo desporto-media globais. Revista Media & Jornalismo. n. 4, 3, 2004.
Nanotecnologia no esporte. Disponível em **cidade**do**futebol**.uol.com.br/ - Acesso em 27 junho de 2007.
Relatório final do plano de modernização do futebol brasileiro. Rio de Janeiro: Fundação Getúlio Vargas e Confederações Brasileiras de Futebol, 2000.
THOMAS, J.R; NELSON, J.K. Métodos de pesquisa em Atividade Física. Porto Alegre, Artmed, 2002.

Rua: Almirante Lamego, 965, ap. 201
Florianópolis, Santa Catarina, Brasil. CEP 88015.600
nivia@cds.ufsc.br

INFORMATION TECHNOLOGY AND SPORTS MANAGEMENT IN SOCCER

ABSTRACT:
Soccer is a world-known sport and, especially in Brazil, it is a synonym of identification with the local culture. Technology presents itself as a source of knowledge innovation and possibilities which aggregates values when they are, adequately, used. The purpose of this study is to demonstrate how information technology can be considered an ally to the decision-making process of sports managers in soccer clubs or associations. It is a bibliographic study that presents situations in which technological resources are used to increase the performance of athletes during their training section and competitions. These resources also come to be efficient in which the identification of problems, anticipation of solutions and athletes´ recovery are concerned. In sports events, the usage of technology contributes to the setting of a journalistic coverage as well as the safety of audience and scope of broadcastings. It also comes to be a key factor in the final result reached by the teams in some matches.
KEY-WORDS: Information Technology, sports management, soccer.

TECNOLOGÍA DE LA INFORMACIÓN Y LA GESTIÓN DEPORTIVA EN EL FÚTBOL

RESUMÉ:
El fútbol es un deporte mundialmente conocido, siendo en Brasil sinónimo de identificación con la cultura nacional. La tecnología se presenta como fuente de innovación y posibilidades de conocimiento que agrega valor cuando es utilizada adecuadamente. El objetivo de este estudio fue mostrar como la tecnología de la información puede ser una aliada en la toma de decisiones de los gestores deportivos en los clubes o agremiaciones ligadas al fútbol. Se trata de un estudio de carácter bibliográfico con relato de situaciones donde los recursos tecnológicos utilizados representaron mejorías de desempeño de atletas en entrenamientos y durante las competiciones. También se mostraron eficazes en la identificación de problemas, en la anticipación de soluciones y en la recuperación de atletas. En eventos deportivos la utilización de la tecnología contribuye para el montaje de la estructura periodística, la seguridad de la afición, el alcance de las transmisiones, y también se mostró decisiva en el resultado final alcanzado por los equipos en algunos partidos.
MOTS-CLÉ: Tecnología de la información, gestión deportiva, fútbol

LA TECNOLOGÍA DE INFORMACIÓN Y DIRECCIÓN DEPORTIVO EN EL FÚTBOL

RESUMEN:
El fútbol es un deporte mundo-conocido y, sobre todo en Brasil, es un sinónimo de identificación con la cultura local. La tecnología se presenta como una fuente de innovación de conocimiento y posibilidades que los valores de los agregados cuando ellos, adecuadamente, se usan. El propósito de este estudio es demostrar cómo la tecnología de información puede ser considerada un aliado al proceso de decisión-fabricación de gerentes de los deportes en clubes del fútbol o asociaciones. Es un estudio bibliográfico que presenta situaciones en que se usan los recursos tecnológicos para aumentar la actuación de atletas durante su sección de entrenamiento y competiciones. Estos recursos también vienen a ser eficaces en que la identificación de problemas, la anticipación de soluciones y recuperación del athletes´ está interesada. En los eventos de los deportes, el uso de tecnología contribuye a la escena de un fondos periodístico así como la seguridad de público y alcance de radiodifusiones. También viene a ser un factor importante en el resultado final alcanzado por los equipos en algunos fósforos.
PALABRAS CLAVES: La Tecnología de información, la dirección de los deportes, el fútbol.

TECNOLOGIA DA INFORMAÇÃO E A GESTAO ESPORTIVA NO FUTEBOL

RESUMO:
O futebol é um esporte mundialmente conhecido, sendo no Brasil sinônimo de identificação com a cultura nacional. A tecnologia se apresenta como fonte de inovação e possibilidades de conhecimento que agrega valor quando adequadamente utilizada. O objetivo deste estudo foi mostrar como a tecnologia da informação pode ser uma aliada à tomada de decisão dos gestores esportivos nos clubes ou agremiações ligados ao futebol. Trata-se de um estudo de caráter bibliográfico com relato de situações onde os recursos tecnológicos utilizados representaram melhoras de desempenho de atletas em treinamentos e durante as competições. Também se mostraram eficazes na identificação de problemas, na antecipação de soluções e na recuperação de atletas. Em eventos esportivos a utilização da tecnologia contribuiu para a montagem da estrutura jornalística, a segurança dos torcedores, o alcance das transmissões, e também se mostrou decisiva no resultado final alcançado pelas equipes em algumas partidas.
PALAVRAS CHAVES: Tecnologia da informação, gestão esportiva, futebol.