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Chapter 1

Introductory Chapter: The Challenges of Technology in Sports

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1. Introduction

Nowadays, the technology is inevitably important and is present everywhere. From the simplest daily task to the optimized complexity of training process, technological innovation seems to be the current reality we must deal with. Recent years have been quite challenging within this subject in sports context and innovations occurred rapidly. Sensors and mobile applications that control biometric data, video systems that analyses athlete's performance and stadiums that are a showcase of technology are some evidences of the emerging innovations that surround sport community. This rapid increase and development not only lead to the emergence of new ways of monitoring the training and competition, to optimize performance, but also new ways of structuring sports organizations (clubs, federations, etc.) and a potential for trade until a very short time ago.

2. Technology and performance

There is a growing trend to monitor human physiological response and performance during real-time physical activities. The development of wearable technology, such as pedometers, heart rate monitors and accelerometers and their incorporation into personal devices, such as mobile phones, allows low cost and easily available monitoring systems for consumers. Besides this use by the "common person," there is a growing niche for the use and development of sensors in competitive sport environment. This will allow individual and sports teams to monitor movement, physiologically and biomechanically, to measure workload and

real-time response, trying to maximize the performance. Moreover, this will potentially allow the identification of fatigue, movement errors and perhaps prevent injuries.

Despite technology is spread everywhere in sports, the main part is the one related with athletes and their performance. Having technology just does not guarantee victories or success. It should be used properly and provide valid and reliable results for coaches and athletes to improve performance. That is why it becomes important to involve the whole sports community in the development of these new methods. In fact, a new technology should also bring great responsibility in the development and use of it by coaches and athletes. Coaches should be aware of these new trends and developments to better use it. So, they must continually update their knowledge and perhaps be helped by a multidisciplinary team composed of physiologists, biomechanics, but also by equipment technician or even an engineer.

The possibility of easy transportation and real-time evaluation provided by wearable devices and sensors determine a step forward in the methods of evaluation and training control. There are great possibilities of controlling and evaluating every little parameter that should influence performance, some of them impossible some years ago. For example, today is possible to give real-time feedbacks regarding the movement performed or even to perceive the real workload for the body in response to an external load. Miniaturized accelerometers and gyroscopes, visual markers and biomechanical data obtained have been the main reference for coaches and athletes. However, there is a vast amount of technology that is being investigated and developed. For instance, technological innovations are been applied to textiles that can be embedded by physiological sensors, allowing interactive analysis by athletes and sports professionals. All these innovations allow optimized learning by sharing real-time data to all sports community and researchers, connecting the expertise and experience and increasing the knowledge for all.

3. Technology and organizations in sports

The technological innovation is also an opportunity for the organizations to reorganize their activity, the follow-up to clubs and athletes during their preparation. Most of all, the organizations have now the tools to provide the best experiences for the spectators, during a competitive event or even to provide the best information they need throughout the season. Nevertheless, we must be aware of several problems related with big data provided and with commercialization. For instance, Is anonymization still effective protecting users against tracking and profiling? In this new reality, is there a proper role for individual consent? How to lead with personal big data problem? What should it be confidential or not? These are some of the questions that easily arise in this new world and are transversal to all realities.

Sports require flexible organizational structures, capable of responding to the challenges of a society in continuous and rapid change, in an environment of social responsibility, respect for high ethical values and transparency. These assumptions meet some indisputable current realities. There is a need to re-adjust organizational administrative procedures, increasing

organizational efficiency and response regarding the institutional mission. There is also a need to increase the attractiveness of new practitioners and spectators, especially in those countries with the lowest rates of systemic practices. It is in this context that sports community must face the challenge of a technological revolution, seeking for the opportunities in all its organizational pillars in sensitive areas as marketing, communication and human resources management. This should be thought of based on a sustainability plan that will make decision-making increasingly competitive and efficient.

4. Technology and commerce in sports

It seems clear the great potential of technology in sports-related context. The development of wearable technology, monitoring systems and apps for phones and computers constitute not only an opportunity for maximizing performance, for improving physical tasks according to a personal objective, for reorganizing institutions and sports events, or redefine the role of coaches, athletes and spectators in sports, but also a business opportunity for many companies.

Several current technological brands and companies have been focusing a lot on the technological side of sports-related subject. These developments have ensured many partnerships with globally recognized organizations. And we are not only thinking on evaluation and controlling methods usually used by coaches and athletes. These technologies allow a full and real-time update, which also brings benefits to fans, who now have available a series of statistical data to track the performance of their idols.

Besides developing state-of-the-art technology for the sports-competitors, several commercial brands identified, a possibility of investment and profit. But several questions arise in this "battle" for the best service and price, seeking for profits. Should we trust in all the data provided by all the emergent and innovative technology? What about the validity and accuracy of the measurements? Is all the data reliable?

5. Conclusion

There is still a long way to go, but we must believe that the technology applied to sports represents an open door to new arising knowledge and potentiation of the sports phenomenon. With the rapid increase of technology applied to sports and physical activity, there are some questions that should be discussed by the sports community. Probably, sooner or later, regulations will have to adjust to what might be questioned as the new doping emerging from modern society, the technological innovation. Moreover, some roles should be redefined and organizations should be restructured to take advantage of the new features provided. Nevertheless, one should not forget to comply with the ethical standards and confidentiality when required.

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