



RESEARCH ON THE TOKYO 2020 OLYMPIC GAMES AND SPORTS SMART TECHNOLOGY

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Abstract:

The main purpose of this research is to understand the Tokyo 2020 Olympic Games and sports smart technology. In recent years, with the spread of economic proliferation, there has been a boom in sports around the world. Under the influence of sports and health culture and the advent of the elderly society, the health and care industry in Japan has stepped out of the traditional service industry. More and more cases of Internet of Things (IoT) technology, AI artificial intelligence and sensing technology applications have come out; and the health and care industry is booming. Therefore, the Japanese government looks forward to the hosting of the 2020 Olympic Games and promotes the Olympic Games under the slogan "Discover Tomorrow", so that the international community could see international participation and sports technological innovation of Japan. Taking "Olympic Games brings inspiration, could change individuals and society" as the action policy, to create a comfortable, convenient, efficient, and safe living area, show the soft power and hard power of Japan, let the Olympics affect Japan not only limited to the period of the Olympic Games, but also change citizens' life. Breakthrough technologies and innovative applications pioneered by sports technology combined with the sports industry would be one of the focal points in this Olympic Games. Therefore, based on the sports technology industry, this study explores the possibility of innovative technology applications to develop new business opportunities for future sports technology.

Keywords: Tokyo Olympics, smart technology

1. Introduction

In recent years, many cities hosting international events have been committed to improving the image of the city, and bringing huge benefits to the country through the event (Huang, Chiu, Lin, & Lin, 2019). At the same time, in order to welcome foreign guests, athletes, tourists, etc., the host city would restructure and re-plan the city, including the landscaping of the city, the rectification of the transportation system, the

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construction of sports venues, and the environmental conservation. These specific actions would reshape the city's image and create a healthy and fresh urban atmosphere (Kuo, 2014; Hsu, & Huang, 2006). Looking back at the history of the Olympics, this international sports event originated in Greece has been held three times in Asia so far: Tokyo in 1964, Seoul in 1988 and Beijing in 2008. Tokyo, as the first Olympic host country in Asia, hosted the Olympics in 1964. The first commercial high-speed railway "Tokaido Shinkansen" was launched 10 days before the Olympics, successfully establishing a new image of prosperity. Japan hoped to show the world the achievements of 20 years of post-war revival, shake off the shadow of the defeated country in World War II, erect its status as a world modern power, and open up the opportunity for Japan to return to the international community after the war. Preuss (2000), a scholar who has been studying the impact of the Olympic Games for a long time, also points out that the scope of the event impacts include economic dimension, political dimension, tourism dimension, ecological dimension, technological dimension, psychological dimension, and so forth.

Many countries or cities have multiple considerations when organizing international large-scale sports events. These considerations mainly focus on whether sports events could bring substantial benefits to the country and society (Liu, Broom, & Wilson, 2014; Sant, & Mason, 2015). The Tokyo 2020 Olympic Games, called "Discovering the Future", is a revolutionary movement for the whole society from economy, science, technology, culture, life, and education, to make Japan more open, closer to the world, and use soft economic ideas to export to Japan's soft power and create itself as the pioneer of Asian lifestyle. The meaning of today's international large-scale sports events has been extended to the development of entire cities, regions or countries through sport events (Hsu, & Huang, 2006).

Hosting the Olympic Games is the dream of many countries and cities; it is a demonstration of a country's competitiveness. From the general consensus during the bid period, to the city renovation during the preparation period, and even the improvement of the national image, it has attracted worldwide attention. The winner of today's Olympic Games is a global media focus. With the endorsement of corporate brands, the winner has become a hero of worship in consumers' minds, and of course, has created the commercialization of Olympic Games (John, 2008). Therefore, this study focuses on the concept of sports science, explains the economic benefits of sports industry brought by sports science, and proposes strategies for the future development of sports science. Finally, this study makes a summary, in order to have a general view of sports science and further enhance the benefits of the future development of sports science industry.

2. Interdisciplinary Development Trends in Sports and Technology

In recent years, there has been a boom in sports around the world, with cycling, for example, becoming a powerful global craze, followed by marathons such as road running. The main reason why road running is becoming more and more popular, even becoming a lifelong sport, is that many sports are limited by special venues, equipment,

and even the number of companions and persons ([Zhang, 2018](#)). However, road running has a lower threshold of technical requirements and is less affected by the hardware facilities around the site. Therefore, it is relatively suitable for parents and children to participate together (Chen, 2011). As for the indoor sports part, many gyms and indoor sports centers are always crowded after work hours, and yoga classrooms have sprung up (Lo, Chang, Huang, & Lin, 2018). Working out is a popular national sport, and sports science industry is the next development trend that attracts much attention. This is the main driving force for the sports science industry-academia alliance to take the lead.

With the continuous technological innovation, the emergence of the Internet of Things (IoT) lifestyle enables people to adapt to the environment to increase the possibility of intelligent living. Internet of Things technology has been widely used in logistics, retail, service industry, electronics, medical management and other business areas (Liao, Yang, & Lee, 2015), and has expanded to the development of smart cities in recent years (Hsu, 2015). In the past, high-tech smart technology was mostly used for the training of elite athletes. However, with the popularization and parity of smart technology, and at the same time as the mass sports population continues to grow, the sports population could use smart devices (such as tablets, smart phones, etc.) and wearable equipment to get relevant data during their exercise. According to the research of the consultant company, Garner, Internet of Things products and related service providers would generate a marginal revenue of US\$309 billion by 2020; and the sales of various types of IoT terminal devices are expected to generate up to US\$1.9 trillion in economic added value worldwide (Garner, 2015). Relevant merchants combine the Internet of Things technology to develop smart watches, smart bracelets and smart sportswear, and record motion data and motion control through sensors in the accessories. Development of various sports applications, such as applications that record jogging mileage and calorie consumption, record usage data of fitness equipment, and update data in real time on smart devices held by them. The statistical functions in the program also provide the general public to perform after exercise data analysis and plan to improve their athletic performance or physical fitness.

3. Application of Sports Smart Technology in International Events

In the application of sports communication platform, the American National Football League (NFL) cooperates with Twitter Amplify platform. Twitter users would get NFL real-time news, match analysis, match replay and match highlights. Users could share messages with each other remotely. Through smart devices and the settings on social networking sites the users are prompted to update their content in real time. The users could receive the content that they are interested in or following (Duffy, 2016). In addition, the Internet of Things technology has been used in smart home life. Smart devices or mobile phone applications could be used to connect home appliances. In addition to automatically controlling the switch of home appliances through a network connection, smart monitors could also be connected to monitor home security. The same concept has also been applied to golf. At present, an automatic golf club car has been

developed, which could connect the intelligent device on the player through the sensors to automatically cooperate with the player's movements. This has become a brand new experience in golf (Hornyak, 2015). In the golf training course provided by Ladies Professional Golf Association (LPGA), the Internet of Things technology is applied to record the swing performance of famous players on the par and various holes through cloud computing in the application program. Through the mobile phone application program, students could obtain and simulate the players' swing strategy, which makes the learning process more fun (Delgado, 2014).

The emergence of virtual reality (VR) complements the presence of traditional training. In addition to the well-known scenario simulation, VR technology could now digitize the performance of opponents and make it an exercise object. For baseball, the training system used by Japanese professional baseball players simulates the pitch, speed, and breaking ball of the opponent's pitchers, as well as analyzing the performance of hits. In terms of the viewing experience of the game, the synchronized viewing with the players, interactive time slicing, and 360-degree VR live broadcast shown in the 2018 Pyeongchang Winter Olympics in Korea may all appear in the Tokyo 2020 Olympics in a more mature manner. In addition, with the aid of AI analysis and 3D visual animation, the real-time game information could be presented to enhance the spectator experience of sports events. The general public has widely used smart technology to assist sports. In future sports venues, sports equipment and other sports service industries, how to combine the Internet of Things technology to create a smart and friendly sports environment should be considered. Since the introduction of big data, virtual reality and artificial intelligence into our lives, the sports industry has also begun to change. From the equipment on the field to the training of players, all aspects have become more accurate. The flexibility and precision of the instrument has been improved. The referee is no longer the sole criterion for determining the score. Technology, with its sharp vision, is the fairest judge on the field (Chen, & Ding, 2016). When it comes to the training of athletes, virtual environments for various exercises have been applied. Players' quality and performance are analyzed by big data, and physiological control also relies on the advice given by artificial intelligence. In the past, the key to the game was team quality. In the future, victory or defeat would likely depend not only on the player's physical fitness and team quality, but also on the cost of technology that the team could afford.

Therefore, in response to the Tokyo 2020 Olympic Games and the application needs for 5G commercial applications, Tokyo has teamed up with the four major Japanese telecommunications companies to deploy 5G infrastructures in venues, important government buildings, convention and exhibition halls, subway, parks and other public places. During the games, for example, the transportation system would face the challenge of a huge influx of people and insufficient supply. Japanese officials also estimate that Japan's annual economic growth rate would increase by 0.7-0.8 percent, or about a total value of NT\$0.9 million to 1.2 trillion, and would attract 8.5 million tourists to visit Japan (Tseng, & Hsiao, 2013). In response to millions of spectators and players from all over the world, the Tokyo Olympics would launch autonomous taxis. The autonomous taxi, which is paired with a multilingual service, automatically maps out the

fastest route to the destination when a passenger calls from a mobile phone. In addition, face recognition technology is used to shorten the entrance time and strengthen the security prosecution of venues; automatic arrangement of parking line would save driving time to look for a parking space; AI analysis technology is applied to help athletes train or provide immediate medical support; intelligent robots on site assist in reception guide, delivering food and drinks, and even picking up balls on the field.

4. Conclusion

In the future, the application of big data and artificial intelligence would become the new trend of the next wave of sports technology industry development. Thanks to the maturity and popularity of smart wear, the physiological data collected by athletes in sports is becoming more complete and the accuracy has been greatly improved, which has directly led to the application of Machine Learning to sports data. In the future, the maturity of artificial intelligence would bring more diversified applications of sports services and products to professional elite athletes and general leisure sports people. Therefore, Japan's emphasis on the Tokyo 2020 Olympic Games lies in marketing Japanese high technology. By investing in sports venues and equipment, the government has enabled major Japanese manufacturers to begin research and development of sports technology. Combining existing technology and market, the government hopes to become the leader of smart technology in the future, and once again announce to the international community the strength of Japan in economy, technology and culture. The Olympics is a race for human beings to challenge their limits and show strength and beauty. However, only by no longer equating the athlete winning with the national physical ability, and regarding the civil ability and health management as a major policy, and making good use of sports technology and creating sports culture, could truly step forward to a more civilized and progressive country.

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