The Positive Impact of Technological Changes on Athletes and Audiences

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Abstract: Achieving business success usually cannot be done without recognising and analysing the business environment. Similarly, the technological environment has a deep impact on the sports industry. Its development can not only improve the professional performance of athletes and sports members, but also bring a more enjoyable sports perception to the audience. This paper focuses on the influence of technological change in the sports industry and the challenges of applying new technology in the industry. It uses secondary research by collecting and analysing data obtained from reports, books and journal articles. It discovers that technological change has the potential to positively influence both athletes and audiences. It helps contribute to new forms of sports, improve the integration of technology and facilitate athletes' training performance, enhance athletes' training interest, as well as helps audiences improve their ticketing experience and venue experience. However, applying new technology is challenged by issues of perceived usefulness and perceived ease of use.

Keywords: sports business, technology, technological change, technology acceptance and diffusion of innovation

1.   Introduction

Achieving business success usually cannot be done without recognising and analysing the business environment. González-Serrano et al. argue that the business environment is a critical success factor for a business as it is supposed to exchange resources, labour and information to sustain development [1]. A widely accepted model of examining the business environment is the PESTEL model, which recognises six dimensions of the macro business environment, including political, economic, social, technological, legal and environmental factors [2]. The research will focus on the influence of technological change in the sports industry. The technological factor is a generally important dimension of the business environment as technological development can usually improve the effectiveness and efficiency of doing business by dealing with existing problems or improving the current solutions to the problems. Ratten demonstrates that the technological environment is key to the sports industry in two aspects [3]. On the one hand, technological development can enhance athletes' and sports members' professional performance. For example, technological development in the swimming suit can help swimmers swim faster. On the other hand, technological development can help audiences enjoy sports more effectively. For example, live streaming enables audiences to not only watch how athletes perform but also understand interesting stories behind the competition.

Therefore, the paper aims at exploring how technological change can influence the sports industry. Although the research topic is not a new one, it needs an update as technology advances quickly. Since new technology has emerged and been used in recent years, there is a lack of a detailed and updated investigation into the research topic. Besides, there is another research gap that a lack of synthesisation of new technology in recent years may lead to a lack of recommendations for the future development of the sports industry. Therefore, this paper is also supposed to explore insights brought about by new technology in recent years. To address the two research questions, the paper uses secondary research by collecting and analysing data obtained from reports, books and journal articles. Specifically, it will summarise and analyse key technological changes in the sports industry, which is divided into two broad sections, including the athlete section and the audience section. Following this, it will apply the technology acceptance model and the diffusion of innovation model to discuss the challenges of applying technology. Finally, it will draw a conclusion to the findings and discussions, to suggest both theoretical and managerial implications that technological change can contribute to new solutions to the current problems in the industry.

2. Analysis of Findings

This section will begin by analysing how technological change influences athletes in the sports industry. Athletes should be one of the most important stakeholders in the sports industry. They can be generally divided into professional athletes and amateur athletes. Professional athletes regard doing sports as their full-time job or career. They participate in professional training and winning competitions as a way of making a living. In comparison, amateur athletes love doing sports and treat it as an important part of their life. However, they usually have other full-time or part-time jobs to support their interest in sports. When it comes to athletes, technology changes the way how they do sports. First, technological change enables new forms of sports. A major argument should be that advancement in information technology contributes to new forms of sports such as esports. Esports are competitive video gaming sports that usually involve teams competing with each other to win games [4]. Before the Internet emerged, video games were usually played by single or double players. The emergence of the Internet enables video games to be played by multiple players, although they may be geographically distant. More importantly, video games are not treated as a form of sports until technological change revolutionises sports broadcasting. For example, the HD and 4K broadcasting technology enables esports athletes to have sharper and more vibrant colours. The Livestreaming technology enables fans to watch games and contests more conveniently, regardless of the time, location and device. What is perhaps the most important thing that technological change contributes to esports is that it helps shape the idea of esports. Before the revolutionary change brought about by information technology, playing video games was usually thought of as a way of entertainment and hedonism [5]. However, information technology makes it possible that people to perceive it as a sport and form the sports industry. For example, video gamers can be professional athletes, who participate in professional training and treat playing games as their lifetime career. The audiences become fans of the video games and athletes, who are willing to pay for tickets to online and offline game competitions and related products and/or services. Esports become increasingly popular after COVID-19. According to Nielson's report, esports sponsorship revenue is projected to be $842 million by 2025, as opposed to $347 million in the pre-COVID time. Thanks to technological changes in information, esports become an effective way to connect young audiences that addresses the major challenges of cancelling events during the pandemic [6]. Simanian et al. also points out that esports is an engine to reach gen z consumers and drive sales [7].

One esports example is the LOL (League of Legends) esports. LOL is an online multiplayer battle arena video game. Released in 2009, the game has gained worldwide popularity. Riot Games, the developer of the game, recognises the business potential and organises world championships every

year since 2011, transforming it into a form of esports more than a game. The game is also included in the 2023 Asian Games to be held in China in September 2023 [8].

In addition to the formation of new sports, technological change can improve the training and tracking performance of athletes. A typical example is how technological advancement in photographing can help tennis players improve their tennis ball serving performance. Serving a tennis ball is an important task for tennis players, which influences how they can obtain scores and win a match. As such, when they practice serving, they should ensure that the ball is served in such a position that the competitors feel reluctant to serve back. However, if the players seek the position too 'wildly', the ball may be served out of the boundary. Technological change in the high-speed camera, which is referred to as the Hawkeye camera, can be used to record such a position [9]. Players and coaches can watch the playback and determine how they can improve serving in future training.

While athletes are important stakeholders in the sports industry, audiences are another one. When the sports industry is considered a service industry, audiences are usually customers who pay for the service. In this sense, their experience of consuming sports services is critical to determine the extent to which they are willing to pay for the service. Technological change can improve audiences' experience in various aspects. First, a change in digital technology can help audiences improve their ticketing experience. As information technology contributes to a digitalised world, audiences tend to have digital assets. For example, they purchase tickets online and check the tickets by using their smartphones. An emerging digital technology called non-fungible token (NFT) can improve such an experience. The NFT is a non-interchangeable digital asset stored in a blockchain [10]. It enables content creators to limit and manage the number of owners of an asset so as to create a scarce element that does not exist in the digital world. The NFT can be used in the season ticket membership (STM). Many teams in NBA are considering using the NFT to sell season tickets [10]. In this context, teams are content creators and audiences are owners of NFT tickets. Teams can provide customised ticket-related services such as VIP areas and discounts to audiences, according to the NFT-verified authentication, without worrying that the tickets will be stolen or misused by others.

Secondly, technological change can improve how audiences enjoy watching sports. This can be further analysed by whether audiences watch sports offline or online. In other words, technological change can influence venues. Whether it is online or offline, audiences need physical or virtual venues to enjoy watching sports. When it comes to physical venues, technological change can make them smarter so audiences can feel more comfortable staying there. For example, a smart venue can detect temperature and humidity automatically. When the system discovers that the temperature tends to become high, it will automatically reduce the temperature so that audiences will not feel uncomfortable [10]. Also, some venues in China are equipped with smart bathrooms so that audiences can check where the nearest available bathroom is [11]. There should be particularly helpful for female audiences, who usually have difficulty using bathrooms in public space.

When it comes to online venues, technological change can significantly improve audiences' experience by bringing magic to them. Particularly, AR/VR (augmented reality/virtual reality) technology has been used in online broadcasting so that online audiences can perceive the astonishment of technology [12]. For example, in the final match of the Lol worlds Championship in Beijing in 2017, the host company used AR technology to present a virtual motion picture of a dragon around the venue [13]. Since it was AR technology, the dragon could only be seen from online broadcasting. This significantly improved the online audiences' excitement, contributing to the atmosphere of the final match.

3.   Discussion of Challenges

It is one thing that technological change is discovered to have the potential to positively the sports industry from the perspectives of both athletes and audiences, it is another whether they can perceive

and take advantage of such benefits. This paper applies two models to discuss the challenges of technological application. The first model is the technology acceptance model (TAM). The TAM aims at understanding and explaining why people accept and adopt new technology. According to the model, people use new technology for two reasons, including perceived usefulness and perceived ease of use [14]. Perceived usefulness means the extent to which that people believe using a particular technology will improve their performance or experience. Although people generally believe that technology is useful to improve their productivity in addressing problems, they may not always perceive it immediately. For example, live streaming technology is helpful to develop esports because professional gamers can show their performance effectively to audiences. However, livestreaming is not immediately applied to esports and it was early used to showcase people's individual life [15]. The success of transferring new technology is somehow dependent on coincidence where the new technology is tested with trial and error. Although live streaming technology provides its success in esports, it does not mean that all new technologies can be effectively used at the right time. This depends on how people realise that new technology has the potential to change the way they do sports or watch sports.

Perceived ease of use refers to the extent to which people believe that using new technology is easy, effortless or free from complexity [14]. Realising that new technology has the potential to change sports does not mean that they are willing to accept it, which is based on a cost-and-benefit comparison of using the technology. From the perspective of athletes, they may think using new technology to improve their performance is expensive and they cannot afford it. For example, athletes from poor countries are not likely to have access to the latest technology because they do not afford it. From the perspective of audiences, they may think applying new technology is complex or effortful. For example, using the NFT to purchase season tickets can be complex as audiences have to download apps and provide information to ensure that they can be safely and securely accessed by the blockchain. In this sense, even though audiences may think the technology is useful, they do not think it is convenient enough.

In addition to the TAM, another model used to reveal the challenges of applying new technology is the diffusion of innovation model. The model demonstrates that an innovative idea, product or service spreads and is accepted by people over time, which suggests five stages innovators, early adopters, early majority, late majority and laggards [16]. When new technology is used to change the way, people do or enjoy sports, it relates to a process of how the innovative idea, product or service contained in the technology diffuses among different types of athletes and audiences. Athletes are likely to be early adopters, who have the intention to adopt new technology to improve their performance. If they apply new technology earlier than their competitors, they are more likely to have a competitive advantage [17]. As a comparison, audiences are likely to be late majority or laggards. This is because they are less interested in how new technology will make them more competitive. Rather, they care more about whether new technology can make their life easier [18]. This should include ease of use. If audiences perceive that new technology is difficult to use, they are unlikely to use it even if they know that the technology can make their life better. In this sense, audiences tend to be cautious about new technology and they do not use it until it is convenient enough.

4. Conclusion

This paper focuses on the influence of technological change as well as the challenges of applying new technology in the sports industry. It discovers that technological change has the potential to positively influence both athletes and audiences. It can help contribute to new forms of sports and facilitate athletes' training performance. It can also help audiences improve their ticketing experience and venue experience. However, applying new technology can be challenging because of issues of perceived usefulness and perceived ease of use. Although this paper provides insights into the

research topic, its limitations should not be ignored. For example, the paper draws the conclusion based on secondary data, which may not provide primary data to support the argument. Further research can design a primary study such as a questionnaire survey to study the research topic.

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