Internet-based Technologies are the Tools for Promoting Sportsmanship in Pakistan

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ABSTRACT

In today's digital era, the sports industry is going through a remarkable transformation. It's no longer just a game; the integration of technology in sport is reshaping how teams operate, athletes train themselves, and fans like to engage. Various tools, platforms, and applications for online coaching, performance assessment, smart apparel, and footwear have been created. Thus, it can be inferred that a network of well-organized devices and sensors has emerged to revolutionize sports industry as a whole. However, in Pakistan, technological adoption is often neglected and prejudiced. In the context of sports, Pakistan exhibits a restricted range of diverse athletic activities, mostly adhering to traditional practices and displaying little integration of technology advancements. The primary objective of this research is to examine the impact of internet technology on the promotion of sportsmanship within the context of Pakistan. The researchers have conducted in-depth interviews with athletes and sports professionals, using theme analysis to transcribe and evaluate the participants' comments in a comprehensive manner. The results indicate that technology plays a crucial role in upholding the integrity of the game, and the incorporation of technology in sports may enhance Pakistan's overall performance index.

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1.   Introduction

The extensive use of internet technology also encouraging sports sector to adapt to global digital environment. Such adaptation can assist to fill the gap between sports based physical world and digital landscape. Internet based technologies can transform the way teams work, athletes train and fan get engaged (Giorgio, 2018). Organizations are investing into technology and adapting to the digital global space to avoid the chances of left behind in contemporary highly competitive world. Technology based sensors and wearables tools provide a variety of performance metrics. Since they gather data directly from the athlete's body or equipment, they eliminate the need for subjective observations or manual data entry, allowing for more reliable analysis and insights ("The Future of Sports: How IoT is Revolutionizing the Athletic Landscape," 2023). Perfect physical education facilities can guarantee regular progression of sports track and field teaching activities. Sports and field teaching activities require the assistance of training venues and teaching materials (Yaumas & Syafril, 2019). Given the widespread use of Internet technology today, smarter applications of this technology in stadiums can better support sporting events; nevertheless, when new technologies are introduced, they should be used to stadiums in a way that makes sense. in order to minimize the overzealous pursuit of intelligence and digitization and to better utilize the teaching effect (Burch, 2018). Strong policy support is necessary for the integrated

development of sports and the Internet. Following the government's introduction of the idea of Internet financing, the sports sector has grown to be essential to people's well-being and has transformed the way the economy is structured. The sports sector has evolved and changed with the help of the Internet as a result of the ongoing advancements and development of information technology (Gou, 2021).

The Internet of Things (IoT) has already surpassed this industry in the sports world. The majority of professional teams and numerous other athletes use wearables and other wireless devices to track their movements, training, and performance on game day. These offer practical methods for avoiding injuries, enhancing athletic performance, and even choosing players for teams. In the meanwhile, stadiums are utilizing IoT to create "smart stadiums" of the future, which are intended to boost crowd participation, improve security, and improve the spectator experience("The Future of the Internet of Things and Sports ", 2020). The start of the new millennium has had a significant impact on the advancement of science, technology, innovation, and artificial intelligence. Science and technology have become an essential element of our lives in the twenty-first century; without them, it would be quite impossible to go about our daily lives. In that regard, technology has had a significant impact on the sports industry (Pandey, 2021). The LED stumps created by Australian mechanical and industrial designer Bronte Eckermann have gained a lot of attention in the cricket world lately and have significantly reduced error rates, drawn crowds, and enhanced game quality. Similar to this, coaches and athletes have employed tracking systems like MiCoach and Under Armour 39 to help them manage their health in terms of information on overtraining, weariness, heart rate, speed, jump height, distance run, and other crucial health and performance-related factors (Oppermann, 2019). Nonetheless, there are certain contentious moral and ethical questions surrounding the development and application of technology in the sports industry. Some people oppose technology use in sports because they think it gives certain athletes an unfair edge and calls into question the morality of access fairness (Dyer, 2015).

Sports businesses are facing challenges due to digital transformation, including increased volume and faster adoption of new technology. Sports businesses can expand their product and service offerings and improve the cost-effectiveness and efficiency of their operations by using various forms of innovation. Nevertheless, this is not supported by pertinent theoretical studies. Because of this, this chapter suggests a methodical way to evaluate the potential and constraints of innovation in sports organizations in the context of the phenomena of digital transformation (Nová, 2019). Goal-Line Technology, or "GLT," has gained popularity among players, referees, media, and fans since its official debut during the 2014 FIFA World Cup in Brazil. This technology, which was recently named the greatest football invention of the previous 30 years, uses seven high-speed cameras per goal. Typically, these cameras are installed on the floodlight poles or the elevated service platform known as the "catwalk," which is where many technical functions, including lighting and sound, are controlled("Behind the scenes: Goal-Line Technology," 2018).However, initially object GLT's adoption for long. Protecting association football's universality is one of FIFA's primary goals. According to the organization, "everyone will be playing with the same rules" and "the game must be played in the same way no matter where you are in the world." Should this serve as a valid justification for not implementing GLT, it would seem that it would negatively impact the game's universality (Ryall, 2012).

(Walsh, 2011) also noted that five minutes after we have GLT, one will request offside technology. After ten years, it will be asked for technology for the penalty area. This is not what is needed in the game. Because football is organized by people, it is a human activity, and as a result, it is the most played game worldwide. Once more, a lot of the earlier points are applicable in previous reluctance in using technology in football (Ryall, 2012) observed; since football would be the last sport to use officiating technology, it should be able to take advantage of earlier testing. The distinction lies in the kind of technology that FIFA is ready to employ. A direct signal must be given to the referee within a second of a goal being scored; it will not accept the use of television replays or the assistance of a fourth official reviewing play. As a result, a large audience has seen the frailty of match officials' in-the-moment decisions and their occasional egregious errors, which has infuriated sports fans and ruined the games. Therefore, to assist the on-field officials, some experts suggest introducing video referees and

umpires who have access to TV replays (Collins & Evans, 2008). The use of IoT in sports ushers in a new era in athlete training, encompassing fitness evaluation as well as performance tracking and assessment. This is typically accomplished by incorporating wearable Internet of Things (IoT) technologies that use sensor systems to gather, process, and transmit data, such as biomarkers and/or other pertinent indicators, that can be used to assess the evolution of the athlete's physical and health conditions and estimate their capacity, thereby optimizing their performance (Dian, Vahidnia, & Rahmati, 2020).

Because people and animals are mobile, wearable smart devices are becoming more and more important because they can gather and transmit data while on the go and then receive information from the Internet to help with decision-making. Wearing smart wearables can improve quality of life, boost productivity and safety, and optimize and increase efficiency in applications. The World Health Organization (WHO) states that having a heavy workload at work can put employees at risk for developing work-related stress. Having an excessive amount or insufficient workload at work is frequently a sign of poor time management, which leads to mental stress. It influences heart rate (HR), which then distributes its effects throughout the body. HR tracking is a feature shared by all physical effort assessment systems. There is evidence that HR and mental stress are well-known to be related. Each and every physical effort assessment system has HR tracking. In order to accomplish workload assessment without requiring manual intervention to indicate the start and end of an activity, HR tracking must be integrated with real-time human activity recognition (HAR) or online HAR (Manjarres, Narvaez, Gasser, Percybrooks, & Pardo, 2019). The sensing layer collects data from sensors, tags, and other sources in order to identify objects. In recent years, the process of measuring attributes related to individuals and their soundings has been made easier by the development of low-cost, small-size wearable sensors such as inertial sensors (e.g., accelerator, gyroscope, or barometric pressure sensors) and physiological sensors (e.g., spirometer, skin temperature sensor, or blood pressure cuff), as well as wearable devices (e.g., fitness band or mobile phone) (Qi et al., 2018). FIFA had aimed to preserve the game's universality by promoting uniform refereeing procedures at all levels. FIFA once said that they opposed goal-line technology being used in elite sports because they felt it would make the game different from what is played at lower levels. Professional clubs shouldn't have this technology in place because novice clubs cannot afford the equipment required to provide this level of scrutiny.

1.1. Research Objectives
This study focuses on following research objectives;
- To study the role of technology in sports in Pakistan
- To study technological adaptations in sports and impact on performance
- To analyze impact of technology on fitness of the athletes
- To study the role of technology in advancing spirit of sports in Pakistan.

1.2. Research Questions
RQ1. What is the extent of utilization of sports technology in Pakistan?
RQ2. What part does technology play in fostering good sportsmanship in the nation of Pakistan?

2. Literature Review
In particular, the usage of IoT solutions in sports and fitness has made it possible to streamline data collection procedures through the use of wearables, enabling athletes to train more quickly and effectively. Athletes wear these gadgets as accessories or clothing, and they are built with sensors, a CPU, and a communication unit to allow connectivity within a personal area network (PAN). The smartphone serves as a gateway for wearable devices, enabling them to connect to the internet everywhere they go in addition to storing and processing data (Passos et al., 2021). Nevertheless, some critics contend that despite these many benefits, using technology in sports is unfair and creates important ethical issues. Their primary claim is that those technologies are expensive to obtain and that not all coaches and athletes worldwide are fortunate enough to have access to them, particularly those from emerging and impoverished nations like Bangladesh, Ethiopia, and Nepal (Dyer, 2015). Technology integration in sports has drawn praise and criticism from different groups of people. One of the ways that technology has changed the sports industry and improved the quality of sports for players and fans alike is by reducing the number of mistakes made during play. Hawk-Eye

technology has been used extensively in tennis, rugby, and cricket in recent years. In football, virtual assistant refereeing (VAR) and goal line technology have elevated the game and captured the attention of fans. Moreover, spectators are having more fun with the sport as a result of using those technologies to make the right decisions. The advanced swim suits are made of polyurethane, which reduces skin friction against the body, pulls the body in, and reduces the cross-section area of the body presented to the water, thereby reducing the hydrodynamic drag. Replay vision and Decision Review are occasionally used in various sports. In order to help umpires make more accurate and precise decisions, the cricket stumps and bails are fitted with LED lights that turn on when the bails are fully detached from the stumps. Other features include a variety of camera angles, ranging from Spider Cam to Stump Cam and Snick meter. In a similar vein, there are advanced computer (Pandey, 2021).

However, it appears that technology is influencing the decisions made by referees, umpires, and sport officials on the field. The development of technology has led us to frequently reevaluate the decisions made by the on-field referee, leading us to question their very existence. Similarly, the development of technology in sports has led some players and coaches to use unethical tactics. Specifically, technologies and substances used for performance enhancement have negative effects on teams and athletes (Balmer, Pleasence, & Nevill, 2012). FIFA had aimed to preserve the game's universality by promoting uniform refereeing procedures at all levels. FIFA once said that they opposed goal-line technology being used in elite sports because they felt it would make the game different from what is played at lower levels. Professional clubs shouldn't have this technology in place because novice clubs cannot afford the equipment required to provide this level of scrutiny (Ryall, 2012). For example, the Hawk-Eye website acknowledges an average error of 3.6 mm when judging tennis line calls, which falls within the International Tennis Federation's 5 mm average error limit. Regarding the claim that because measurement errors are not highlighted, "Hawk-Eye as used could unintentionally cause naïve viewers to overestimate the ability of technological devices to resolve disagreement among humans" (Collins & Evans, 2008). There is growing agreement in scholarly and popular perspectives on sports that technology should be used to assist referees if it can increase officiating accuracy. In fact, there aren't many normative objections to technologizing officiating, aside from a few pragmatic worries. When there are, they're usually weakly stated and easily disregarded by detractors. One of these criticisms, which is the idea that sport has lost its human element, and attempt to give more weight to the unease that some people have about this possibility (Johnson & Taylor, 2016).

Broadcasting sports is one domain where a substantial viewership is accessible. The broadcasting channels are in fierce competition with one another to be the first as a result. Channels aim to use the newest technologies available to provide their viewers with an enhanced experience in order to accomplish this. One such technology is Hawk-eye, which broadcasters employed to create a variety of visualizations, such as vibrant wagon wheels (Jayalath, 2021). Even though the television networks were the first to use this technology, advancements have made it a useful tool for making decisions in a variety of sports, such as football, tennis, snooker, cricket, and others. Because it is the first and only ball tracking system available in cricket, it is used to help with LBW (Leg Before Wicket) decisions in the game. The entire play is watched to track the trajectory of the cricket ball thanks to the system's multiple cameras (Collins & Evans, 2008). The majority of systems in use today are not 100% accurate. A small amount of error is present in the majority of technological systems. The Hawk Eye system occasionally tends to make mistakes. This occurs as a result of certain factors that could affect the cricket ball's trajectory being overlooked. The Hawk Eye system does not take into account variables like the bowler's spin percentage or environmental variables such as wind speed, pitch condition, ball flight. In order to produce useful information, data on the cricket ball's trajectory are gathered.

The use of DRS system in LBW decision is one of the most significant uses of this technology. Here, Hawk Eye follows the cricket ball's trajectory from the bowler's release point through the batsman and ends at the stump line. This makes it easier to assess if the ball struck the stumps. This is due to the fact that this choice directly impacts the game's outcome. Consequently, the predicted trajectory must be accurate when the DRS system is used to support the LBW decision. Thus, Hawk Eye technology ought to function precisely. The cricket ball's trajectory must be predicted by the system in order to ascertain whether the ball

will strike the stumps or not (McLoughlin & Dawson, 2017). Young athletes' lives are positively impacted by social media, which raises their motivation to engage in various sports. They converse and engage with coaches, athletes, and celebrities in addition to one another. Expanding the use of location-based social media requires enhancing the digital infrastructure and giving users access to the internet and GPS (Khan, Nizami, & Parmar, 2022). The study discovered that while the researchers have made legitimate efforts to use technology in sports overall, their domain-specific contributions to sports like cricket fall short of what is urgently needed. Apart from the domains covered in the study, further research should be done in areas such as domain-specific talent identification for gender and age groups, a variety of sports, etc (Reyaz, Ahamad, Naseem, Ali, & Rahmani, 2023). The culture of technology assisted activities is widespread all over the world. E-sports is among rapidly spreading outcome of technology. However, three years after its debut, 5G has yet to be implemented in Pakistan (Qureshi, 2023). IoT offers comprehensive data regarding the stance and gait of a sportsperson. Wearable sensors identify any issues that may be directed towards a sports athlete. Following the diagnosis of the issue, the coaches instruct the athlete in proper body alignment and technique for their chosen sport.Information technology benefits athletes in different sports by doing this (Talha, Wang, Maia, & Marra, 2022). A detailed review of literature suggests that a research gap exits while exploring use of sports technology in Pakistan. This study helps to fill this space and address the most understudied topic despite a wide global scope. In pakistan, where there is huge inclination towards sports, transforming this sector according to the international standards is very important.

3.   Methodology

This research used interview method. Purposive sampling technique has been used to draw the sample size of ten athletes and sports experts. Interviews were scheduled with sampled population. Different themes were used to conduct thematic analysis of the recoded responses. Open ended questionnaire was developed addressing all the key categories and sub categories.

Table 1

Themes	Sub themes
Relation of technology and sports	Online coaching
	Social media networks and sports
	Virtual gaming
	Online spectatorship
Adaption of sports technology in Pakistan	Scope
	Application of technology in sports
	Access to world class training programs
	Prejudices
	Challenges
Sportsmanship and technological sports	Fitness assessment
	Workload assessment
	Injuries
	Maximum performance
Fan experience of technology assisted sports	Understanding of the sports
	How they view a sport through technology?
	Interaction will sportsmen
	Access to recorded sports through internet
	Performance comparison
Spirit of sports through technology	Accuracy and justice
	Umpiring experience
	Impact on overall results on the game

4.   Results and Discussion
4.1.   Relation of Technology and Sports

(Giorgio, 2018) notes that internet-based technologies can transform the way teams work, athletes train and fan get engaged. The use of technology is increasing become a new culture in sports where it is expected to bring improvements in this world class industry. Similarly, studies have also found that perfect physical education facilities can guarantee regular progression of sports track and field teaching activities. Sports and field teaching activities require the assistance of training venues and teaching materials. Respondents of the interview viewed the relation of sports and technology a significant one. They believed that

technology is improving the standards of sport and assisting this industry in remarkable way. Different wearable tools and gadgets has helped strengthen the assessment of performance of athletes. Wearing such sensors can give accurate measurement of the workload out athlete thus helping them develop a consistent routine for the players. Similarly, participants also highlighted that much of the trouble in sports has been reduced with incorporation of technology. Modern concepts like online coaching, access to the world class and global training sessions, virtual gaming and online spectatorship have transformed experience on both sides i.e., as an athlete and spectator. Evaluation of scoring and officiating has improved a lot. Integration of technology has improved umpiring concept while assisting field officials to decide with more accuracy.

4.2. Adaption of Sports Technology in Pakistan

(Qureshi, 2023) notes that the culture of technology assisted activities is widespread all over the world. E-sports is among rapidly spreading outcome of technology. However, three years after its debut, 5G has yet to be implemented in Pakistan. As far as technological sport is concerned, it is quite obvious that, the international sports for which Pakistan is a regular participant, are played with similar technological integration as per international rules. For instance, respondents related the example of cricket, for being top sports in Pakistan played frequently, which uses different techniques like DRS and Hawk-Eye view etc. to improve the standards of the game. However, the adoption of technology for training athletes in Pakistan is relatively lacking in number of ways. Similarly, when talking about sports other than cricket the situation is extremely disappointing. To meet the international standards of athletic fitness and minimized injuries (or pre-detection), much efforts are to be made to engage sports with technology. Smart apparels, smart wearable devices and fitness and performance detectors can help overall sports achievements in favor of Pakistan. However, some of the participants of the interview opined that despite lack of physical fitness technology locally, online coaching form world class trainers and access to global training session is possible due the technology. They viewed different challenges and certain prejudices like having long term negative effects of the fitness or performance of the players, as baseless and void. Some of the participants liked the idea online coaching and called it new trend in developed countries doing great in sports sector. Therefore, number of shortfalls can be handled with the integration of technological sports in Pakistan. (Collins, 2010) noted that there has been a prominent improvement in the development of performance-enhancing body suits and sportswear, including shoes, and equipment. These items are crucial for athletes and players who aim to achieve maximum performance in their respective sports.

4.3. Sportsmanship and Technological Sports

Studies have found that endorsement of technology in sports have been widely witnessed. It is irrefutably true that the adoption of new technology must be handled in a way that upholds sportsmanship. Majority of the respondents related that adding virtual reality models to training routines of players also helps them advance their skills and develop a more immersive experience, which leads to whole sports experience better. Harnessing data analytics can make sports teams and players to improve their plans, boost performance, and minimize the risks of injuries, which increase the level of sportsmanship. Similarly, some experts also gave weightage to the incorporation of social media. As the viewership has improved and global fan following through more personalized channels is possible now, sportsmen are more conscious of their performance. It requires them to be more concerned about how they perform as well as behave on the field. Especially young athletes are impacted by social media more positively. Their motivation is raised by the fans to engage in various sports. They converse and engage with coaches, athletes, and celebrities in addition to one another. Expanding the use of location-based social media requires enhancing the digital infrastructure and giving users access to the internet and GPS (Khan et al., 2022). Additionally, some of the particiapnts attributed use of technology with a fairer and accurate sports. Citing the reviewing technology, use of mutiple digital and computrized cameras as well as other similar aspects have assited tranforming assence of sports. Game has become more accurate minimizing illegal means on part of players as well as the officials.

4.4. Fan Experience of Technology Assisted Sports

Technology has transformed the manner sports competition are broadcasted. The broadcasting channels compete with one another to get maximum viewership. Channels aim

to use the newest technologies available to provide their viewers with an enhanced experience in order to accomplish this. One such technology is Hawk-eye, which broadcasters employed to create a variety of visualizations, such as vibrant wagon wheels (Jayalath, 2021). Participants of the interview reported that now fans are more aware about the sport they watch therefore; technology has resulted in active spectators than mere passive viewers. The understanding of sports is due to extensive use of technology into sports in general. Recordings of sports are also available on different online platforms making fans able to compare and analyze the games in past and present. Similarly, social media's assistance in providing interaction between fans and sportsmen has also minimized the gap between viewer and sport. Fans often tend to compare the level of performance by the teams as well thanks to social media which enables them to see the workout and game preparedness of individual players. Therefore, technology has kind of personalized the sports and inspire people for increased engagement. Since viewer has become more active than ever maintaining accuracy and justice in sports have major concern of the officials worldwide.

4.5. Spirit of Sports through Technology

Though technology has widely adopted in sports as to remove the chances of human error, the experts believe that technology is not always perfect. Ehan (2013) notes that the majority of systems in use today are not 100% accurate. A small amount of error is present in the majority of technological systems. The Hawk Eye system occasionally tends to make mistakes. This occurs as a result of certain factors that could affect the cricket ball's trajectory being overlooked. The Hawk Eye system does not take into account variables like the bowler's spin percentage or environmental variables such as wind speed, pitch condition, ball flight. Similarly, role of on field umpires or refrees are also marginalized by frequent appeals and intervention of technoloical reviews. However, there is growing agreement in scholarly and popular perspectives on sports that technology should be used to assist referees if it can increase officiating accuracy. In fact, there aren't many normative objections to technologizing officiating, aside from a few pragmatic worries. One of these concerns, which is the notion that sports have become devoid of the human aspect, and an effort to lend greater weight to the anxiety that some individuals feel about the prospect of this happening. Overall, all the participants of the interview believed that technology, if harnessed well, is more likely improve the standards of sports officiating if used as an assistance to the human decisions. Since both human and technology are liable to error, coordination of both can have best sort out for the accuracy and justice question in sports.

5. Conclusion

Technology has taken the world by storm. No field of life could remain enatct by its impact. The widespread use of technology in sports can be witnessed in almost every sport. From training to officiating and broadcasting to spectating every aspect has technological presence. Studies show that organizations are investing into technology and adapting to the digital global space to avoid the chances of left behind in contemporary highly competitive world. Technology based sensors and wearables tools provide a variety of performance metrics. Since they gather data directly from the athlete's body or equipment, they eliminate the need for subjective observations or manual data entry, allowing for more reliable analysis and insights. Similarly, perfect physical education facilities can guarantee regular assessment of sports and field teaching activities. Sports and field teaching activities require the assistance of training venues and teaching materials (Yaumas & Syafril, 2019). Findings of the study suggest that given the widespread use of Internet technology today, smarter applications of this technology in stadiums can better support sporting events; nevertheless, when new technologies are introduced, they should be used in a way that makes sense. Fans are able to understand the game more than ever before. Findings of the study suggest that standards of sportsmanship have been influenced by technological intervention in sports. Apart from other outcomes, in Pakistan, technology can improve fitness and performance of the players. Similarly, there is need to maximize the adaptation of technology-based tools like smart apparels, footwears and performance sensors to compete the global standards in sports competition. There is also a need to work on uniform technological reforms in sports without preferring few sports so that spirit of sportsmanship can be maintained among the players.

6.1. Recommendations
- Future studies can focus on the potential barriers to implement sports technology in Pakistan.

- While understanding the international sports standards, studies can be conducted to analyze significance of technology in sports.
- Technological implementation in sports and apparent biases in Pakistan can also provide a significant analysis.
- The government policies towards adoption of sports technology in Pakistan can also provide an effective insight into the policies of state.

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