

Influence of Technology on Top Sports Performance - A study

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Abstract

Paper intends to study the influence of technology on sports performance on the sportsmen. One of the most definitive tests for human athleticism is sports, but this does not mean that technology cannot facilitate it. When administering and officiating sports, technology can succeed where humans may not. This guarantees fair judgment of the performance and ensures that athletes win fairly. Here are five exciting new technologies being used in the sports industry today. Instant replay is an example of the remarkable technology being used in sports today. With this technology, officials are able to see exactly what happened, providing a second perspective on sports events.

Sports technology has found a plethora of applications in sports events such as cricket, rugby, soccer, etc. Sports technology has garnered prominence over the recent years, owing to rise in the indoor sports activities such as table tennis, chess, etc., as well as outdoor activities such as athletics, rugby, cricket, and tennis. The rise in the acceptance of wearable equipment by athletes across different countries is likely to extend the growth graph of the sports technology market in an upward direction. Apart from this, the wide acceptance of the internet of things in the sports sector has played a key role in fan engagement and players physical growth. Introduction of new kinds of sports technologies has helped in making players mentally strong, assisted physiotherapists, and helped in improving the training programs to enhance the performance of the sportspersons in various sports events. All these aspects will drive the growth of the sports technology market in the near future. Moreover, uses of AI-based solutions and big data analytics in sports have helped in performance evaluation, effectively handling of ticket sales activities, athlete training, and sponsorship activations. This, in turn, will boost the industry trends over the years to come. However, the increase in Cybersecurity threats and hacking issues are projected to diminish the growth of the sports technology market. Nevertheless, a rise in the acceptance of new technologies in sports media is set to spur the sports technology industry progression. Additionally, growing need for new techniques such as analytics and wearable equipment for enhancing athlete performance and team performance will offer lucrative growth avenues for the sports technology business. The sports technology market can be segmented into technology, sports, application, component, and end user. This means that differences in reaction time no longer affect the precision and consistency of a racing event. In many races today, the starter pistol is linked to a clock. Once the pistol goes off, the clock immediately starts timing the race. *Key words: technology, industry, sports, business, application, component, Cybersecurity, performance*

Introduction

Instant replay is used in games like cricket, American football, rugby, soccer, and even in combat sports. However, FIFA banned instant replays on screens in sports arenas during the 2010 World Cup for fear that it might incite fans to behave untowardly. Sensor tools are often used to analyze whether a goal is valid or not. It is often used in cases where the naked eye cannot truly tell if a ball went past the goal line. Different sports use varying sensor tools. For example, cricket's Hawk-Eye technology analyzes sound to determine if the ball smashed into the bat before it was caught. Hawk-Eye is also used to determine where the ball would have landed if it had not hit a player's foot. This establishes whether the ball was unfairly blocked from striking the wicket. On the other hand, tennis sensor tools use laser beams to determine whether the tennis ball went out of bounds or not. Sensor technologies help to accurately determine the position of the ball at a given time. Nobody uses a stopwatch when timing a race anymore. On the other hand, swimming uses a touch pad placed at the finish lanes as well as wearable inertial sensors to determine performance. Many racing events also use laser beams and photographs to determine winners. The results of timing systems are often provided to the nearest thousand of a second. However, world and Olympic records are only recorded to the nearest hundredth of a second. This technique was established to eliminate insignificant errors.

RFID chips are often used to time individual contestants in an event. The devices use antennas that relay wireless signals. RFID chips are often used in long distance races to help broadcasters and viewers track the exact locations of contestants during a race. There are two types of chips used in races: active and passive chips. Active chips have an in-built battery or power source and can determine the exact time a participant crosses a specific line. Passive chips can only be used with sensors placed in a mat because they do not have an in-built power source. In sports, safety is a key factor. Equipment manufacturers have developed devices to reduce injuries on athletes. In the 2010 season, special helmets were used in the National Football League after several players experienced concussion injuries. The helmets were designed to absorb shock caused by collisions and protect athletes from suffering head and neck injuries. Similar technology is being used for games like auto racing and hockey to enhance the safety of participants. Technology has taken over today's modern world. Many professional and amateur sports bodies have embraced new technologies featuring certain gears and gadgets to protect athletes and make it easier to officiate the games. The 2011 film Moneyball has a simple premise: The general manager of the Oakland A's, Billy Beane (played by Brad Pitt), must assemble a winning baseball team using the franchise's limited budget. He meets Peter Brand (played by Jonah Hill), a young Yale economics graduate with radical ideas about baseball. He loves player data and wants to use it to help Beane assemble a team. That season, as portrayed in the film, the A's did not win the World Series, but the data-driven method Beane and Brand developed was sound, and would be used by the Red Sox to win the 2004 World Series a few years later. Today, sabermetrics is a standard in baseball, used consistently to pick players and win games. It's just one aspect of how technology is now being embraced by professional organizations across a number of different sports. Some are using tech to improve the fan experience, and others for player safety.

Objective:

This paper intends to explore the influence of latest technology in pop sports and the performance on the sportsmen; also, that take technology to the new heights to bring about the nominal change in improving sports money ability and performance on game.

Global Sports Technology Market: Growth Factors

No matter the use, technology is taking sports to new heights. It's a Numbers Game, More Than Anything When you think about sports, you think about athletes competing and having fun; they're playing a game after all. But really, the game they are playing is a numbers game. Sports are dominated by data and data analytics. Combine that with IoT (Internet of Things) and you've got the tech trend that will dominate sports for the next 10 to 20 years. On-field cameras and tracking devices embedded into players shoes, helmets, and other gear track players and their statistics in real-time. This allows team coaches and managers to quickly assess undervalued players and dial-in team dynamics that need to be improved. For instance, Major League Baseball introduced StatCast by rolling out cameras and radar equipment to every team's ballpark for the "gathering and displaying previously immeasurable aspects of the game." The analysis helps team management pinpoint areas of improvement, award outstanding players, tweak lineups, and more. Once instituted, staff can eventually use the data to create trend-lines and get better at gaming their own success.

The Golden State Warriors are the NBA team to beat. They've been to the finals for four consecutive years and have won the championship twice, with the outcome of their most recent showing still yet to be determined. After years of being among the association's worst, almost overnight the Warriors have created a legendary organization, and a force of talent that rivals the all-time greats of the sport. They've done it by building great teams, of course. But they've been able to build great teams - and get the most out of them - using data. How? When the Golden State Warriors owner's son, Kirk Lacob, a Stanford graduate, was made assistant GM of the Warriors' G-league farm team, the Santa Cruz Warriors, he started using data and statistics to track players. It was a test program for the Golden State Warriors, who were looking to use analytics to improve team performance.

Lacob's program was quickly a success, propelling the Santa Cruz team to the finals in his first two seasons. His methods were later adopted by the Golden State Warriors, with Lacob joining their front office full-time. Today, the Warriors still crunch data to dissect their strengths and weaknesses, using a metric called EPV, or Estimated Possession Value. This data point is created by an array of high-tech cameras that track every player, every shot, and every inch of the court. The statistical model captures the action and translates it into formulas that the front office then uses to create plays. In the most simple terms, the model determines where (the specific location on the court, and specific defender guarding against) a player is shooting best to score points.

Using Tech to Call The Shots

High-tech cameras (which were originally designed and used by the military to track missiles) capture 25 frames per second, with six in total usually positioned to cover all the action at any given NBA game. The cameras and analytics system have given NBA teams new and unique insight into a treasure trove of data that has helped them supercharge performance. Virtual Reality is being used both on and off the field to help improve player performance and give fans a better viewing experience. From a player perspective, imagine a quarterback that practices his passing in a virtual space that looks and feels like a holodeck version of Madden Football. Coaches (and quarterbacks) don't have to worry about injuries and they can review the data captured to refine the players training. From a fan perspective, VR will get you closer to the game, and even on the field. FOX Sports partnered with NextVR to broadcast live sporting events using VR technology, and with ticket prices still headed toward the stratosphere, VR might be the best (and most affordable) way to enjoy a game in the future. For example, don't like your seat? With VR, you can move your view closer to the field or even take in the national anthem while standing right next to a player on field. Imagine being able to take that home run lap with your favorite pro courtesy of the VR cam mounted into his batting helmet. Much in the way that the movie Moneyball exposed audiences to the fact that sabermetrics was a thing, Will Smith's Concussion opened

audiences eyes to the long-term effects of head injuries on pro athletes, particularly NFL and NHL players. The NFL has mobilized to address the issue, improving and upgrading equipment using technology. Research found that traditional NFL helmets, for example, were actually not as helpful as once thought to protect players from brain injuries. To that end, Riddell introduced SpeedFlex helmet technology to offer players a customizable smart helmet. Sensors and magnets help detect the collision, and disperse/absorb the impact. The helmet tech doesn't end there, as the hit is tracked wirelessly to the sidelines where player staff evaluate concussion data in real-time. The same tech could be applied to helmets for snowboarders, lacrosse players, and more. Mouthguards and other type of equipment is also becoming IoT enabled. Importantly, while technology is changing sports for us as fans and viewers, it's doing wonders in the way of increasing player safety.

The Show with Virtual Reality

You don't have to watch too many games to know that referees are human—and make mistakes. Technology is looking to change that. While instant replay technology has been around for a while, VR and 360 degree cameras are now giving refs (and sporting commentators) an unprecedented view of the action. And if you're wondering if such changes are actually needed or are simply for show, imagine how hard it is for a ref trying to keep an eye on ten different players at a time, all while being heckled from the stands. It's difficult enough to follow the action from your couch. Still, though, It's a sensitive topic, as purists believe the introduction of such tech completely removes the human element; which is something that makes sports entertaining in the first place. Even so, the major sports associations are working to continue to find ways for technology to support human game callers. For example, FIFA implemented goal-line technology which works with live refs to make them aware if a goal was or wasn't scored. Fancy player-tracking tech isn't just for major leaguers—it's also available for local high school baseball/soccer/football teams. Platforms and wearables like FieldWiz and PlayerTek help coaches and players capture data, analyze it and use it to improve performance. DribbleUp does the same thing for soccer

In the future, as player metrics and goals become more refined, more apps and platforms will appear that do a whole host of things, from tracking what a player needs to eat to stay in top shape to gamifying a pick up-game of soccer. eSports continue to rock traditional sports associations and their franchises to the core as viewership continues to drop on major sporting events. But major sports franchises (and their owners) aren't turning a blind eye, and in fact, they're looking to partner with eSports leagues, teams, and players. There's even a fantasy league for eSports... Is eSports the future of sports? It's hard to tell, but it definitely is going to play more of a role in the future as younger audiences grow up on the platforms. In the world of sports, tech is building better athletes, and keeping them safer on the field. As fans, it's helping us follow the action, and in the case of social media technology, helping directly connect us with our sports heroes. Tech is going to play an even bigger part in sports in the future. And it's why if you're an athlete, having an interest in STEM is going to help you in the long run. As these technologies become integrated into play, a solid understanding of STEM can help you make the most of them. Want to learn more? Enroll your child an iD Tech summer camp to get them started building the knowledge and skills needed to utilize and even create these incredible technologies. The use of technology in sports is growing rapidly. In football, for instance, new devices are used for different reasons such as to help referees in decision-making and to quantify the athletes' performance during a game, thus helping the coach to set the training program and the game strategy. The video camera became commonplace in the 1980's and provided sports coaches with a way to capture and analyse sport performance like never before. The video camera is perhaps the single most important development in coaching in the modern era of sport.

As a result of miniaturized video cameras, spectators are also now able to witness sport performance in ways that previously was not possible. Video cameras can be placed in places such as racing cars, cricket stumps, goal posts, and even on the athlete

themselves. One of the most famous and recent technologies introduced in football, is called 'goal line technology'. It is used to determine if a ball has crossed the goal line, in order to support the referee. Instead, as regards the quantification of the athletes' performance during a football match, different kind of devices have been produced in the last few years. Electronic timing controlled by computers is employed to measure performance times of athletes in a great many sports including Athletics, Cycling, Skiing, Bobsled, Triathlon and many more. In the case of Athletics, the electronic timing also measures the athlete's reaction time to the start gun in case the athlete moves too early in the blocks.

Global Sports on performance and technology Market

The Force Platform is an apparatus placed under the feet of the athlete and measures their 'ground reaction force'. This is useful in sports such as Weightlifting and enables measurement of force and acceleration throughout the athlete's performance of a lift. Curiously, the measurement of force is due to the miniscule change in properties of crystals upon which the platform rests. Hawkeye Technology, a computer system first used in 2001 for showing the trajectory of a cricket ball has made an immeasurable difference to the sport of Cricket. Coaches use algorithms to know exactly where and how their players move on the field. Coaches use algorithms to know exactly where and how their players move on the field. Hawkeye produces all manner of statistical analysis such as ball speed, ball pitch on the wicket and trajectory of the ball after bounce. Hawkeye is now used in Tennis to assist in determining whether a shot is 'In' or 'Out'. The analysis of sport performance provided by Hawkeye has greatly enhanced the spectator's knowledge and involvement. Wearable devices that can monitor heart rate have been integrated with tracking technologies that include global positioning system (GPS), accelerometer and gyroscope sensors, which are used to describe the athletes' movement and physical demands. Therefore, these new technologies can assess the number of collisions and jumps that occur during a match. These data-sets have become increasingly important for coaches, athletic trainers and doctors. In fact, coaches use them to provide better strategies for their team. Sports technology is mainly been adopted in outdoor sports activities such as cricket, football, soccer, and rugby. The games are dominating in terms of revenue to the sports technology market. The adoption of Internet of Things (IoT) in the sports industry is the key factor that drive the growth of the sports technology market. In addition, significant improvement in audience engagement and growth in demand for data-driven decisions and operations also fuel the market growth. Furthermore, increase in online and offline sports events boost the growth of the sports technology market. However, high initial investment and budget constraints and rise in cybersecurity concerns restrain the market growth.

Some of the major factors that drive the growth of the sports technology market include adoption of Internet of Things (IoT) in the sports industry, significant improvement in audience engagement, growth in demand for data-driven decisions and operations and increase in online and offline sports events. However, high initial investment and budget constraints and rise in cybersecurity concerns are expected to restrain the market growth. Each of these factors is anticipated to have a definite impact on the sports technology market during the forecast period.

The sports technology market is highly competitive and the strategies adopted by the key players include new product launch, product development, business expansion, merger, and acquisition. Fujitsu is one of the key players in sports technology market. For instance, in June 2018, Fujitsu has expanded its sports analytics business through RUN.EDGE in Japan. RUN.EDGE is a Fujitsu subsidiary that is established through a company split. RUN.EDGE combines the core technologies developed by Fujitsu

and Skylight Consulting Inc. for image search and image analysis in sports. By focusing on sports analytics, Fujitsu raises the dynamism of the business and expands the use of ICT in the sports sector.

Smart Sports Equipment

The sports technology market is segmented based on technology, sports, and region. Based on technology, the market is categorized into device, smart stadium, esports, and sports analytics. Based on sports, it is divided into soccer, baseball, basketball, ice hockey, American football/ rugby, tennis, cricket, golf, and esports. Based on region, the market is analyzed across Europe, Asia-Pacific, North America, and LAMEA.

The major companies in the global sports technology industry include IBM, Ericsson, Cisco, Fujitsu, SAP, Oracle, NEC, LG, Sharp, Samsung, and others.

Advances in technology have had a profound impact on sport including:

- Analysis of sport performance and enabling coaches to greatly improve the quality of feedback to players/athletes
- Increase accuracy in time measurements of sport performance
- Enabling referees, umpires and sport officials to make better decisions on rule infringements
- Improvements in the design of sport equipment and apparel
- Providing spectators with better viewing of sport performance

Sporting equipment is continually undergoing research and development to improve sporting performance. Some of the best examples include:

- Full body swim wear, made of polyurethane, made a huge impact in the 2008 Olympics only to be banned a year later because it was too obviously making a difference to sporting performance
- Kevlar fibre (5 times stronger than steel yet lighter, used in the manufacture of sails, bicycle tyres, football boots, tennis rackets, helmets, body armour and more
- Raving cycles and rowing shells made of lightweight but strong materials that minimise drag though the air or water
- Technology in racing cycles

Knowing exactly where and how their players move on the field, they can choose the best player for each position or change a player according to the opponents' level. Athletic trainers use these data-sets to plan the training sessions during pre and regular season, and use technologies to provide measurable training routines, customised for each athlete. For example, some technologies have been designed to enhance both the physiological and psychological elements of the game. Moreover, athletic trainers, team doctors and coaches can utilise heart rate and sensor data to prevent injuries when players are about to exceed their physical thresholds. Besides, the media also love data since it gives added value to their reports. Recently, big clubs have used data provided by these new technologies to scout potentially interesting players. It can be argued that the use of new technologies is changing not only the way of training players and playing their sport, but also the whole experience of living and watching sport on TV across the globe. Some people decry the use of technology to improve sports performance but in reality it is inevitable.

The research and development of sport apparatus and apparel is an industry in itself which creates opportunity for investment and employment.

Conclusion

On the basis of technology, the sports technology market is sectorized into the device, sports analytics, smart stadium, and esports. Sports wise, the industry is divided into soccer, swimming, golf, rugby, basketball, tennis, ice hockey, badminton, cycling, and baseball. Application wise, the market is divided into active and passive applications. Component wise, the industry is divided into software, services, and wearable devices & sports equipment. Based on the end user, the industry is classified into coaches, sports associations, clubs, and leagues. Based on the region, the sports technology market can be divided into five main regions: North America, Asia Pacific, Latin America, Europe, and the Middle East and Africa.

The sports technology market growth in the Asia Pacific is influenced by an increase in the sale of software & hardware and rise in the funding of new sports technologies in China and India. In addition to this, the thriving e-sports sector in the Asia Pacific will further proliferate the market scope in the region. The sports technology market in Europe is anticipated to gain traction in the years ahead, subject to the utilization of new technologies in sports across various European nations. Furthermore, the rise in the blockchain technology and AI in the European region will further boost the regional market scope. North America and Latin American markets have huge growth prospects and will steer the overall market earnings in the near future. By sport, the sports technology market is segmented as soccer, basketball, baseball, tennis, cricket, and others. Soccer will hold the largest share in the market owing to the high popularity in the sports industry and substantially large investments throughout the forecast period. Additionally, cricket and other sports are projected to grow at a good pace during the coming years, with the other segment seeing an increase in the share to reach 38.56% by 2024. Tennis and Basketball will also see good growth owing to the increasing popularity of sports in multiple countries. Baseball will grow at the slowest rate owing to the limited popularity of the sport.

References

1. "Definition of sport". SportAccord. Archived from the original on 28 October 2011.
2. Council of Europe. "The European sport charter". Retrieved 5 March 2012.
3. "List of Summer and Winter Olympic Sports and Events". The Olympic Movement. 14 November 2018.
4. "World Mind Games". SportAccord. Archived from the original on 8 May 2012.
5. "Members". SportAccord. Archived from the original on 7 May 2012.
6. "Women in sport: Game, sex and match". The Economist. 7 September 2013.
7. "The Most Popular Sports in the World". World Atlas. 2018. Retrieved 17 August 2018.
8. Harper, Douglas. "sport (n.)". Online Etymological Dictionary. Retrieved 20 April 2008.
9. Webster's Third New International Dictionary of the English Language, Unabridged. Springfield, MA: G&C Merriam Company. 1967. p. 2206.
10. Roget's II: The New Thesaurus, Third Edition. Houghton Mifflin Harcourt. 1995. ISBN 978-0-618-25414-9.
11. "Judicial review of 'sport' or 'game' decision begins". BBC News. 22 September 2015.
12. Council of Europe, Revised European Sports Charter (2001)
13. Front, Rebecca (17 July 2011). "A little competition". The Guardian.
14. Scrimgeour, Heidi (17 June 2011). "Why parents hate school sports day". ParentDish.

15. "Sports History in China".
16. "Mr Ahmed D. Touny (EGY), IOC Member". Archived from the original on 29 October 2006.
17. "Persian warriors". Archived from the original on 26 March 2007.
18. "Ancient Olympic Games". 30 July 2018.
19. Sport and the Law: Historical and Cultural Intersections, p. 111, Sarah K. Fields (2014)[ISBN missing]
20. "Sportsmanship". Merriam-Webster.
21. Fish, Joel; Magee, Susan (2003). 101 Ways to Be a Terrific Sports Parent. Fireside. p. 168.
22. Lacey, David (10 November 2007). "It takes a bad loser to become a good winner". The Guardian.
23. "Gym class injuries up 150% between 1997 and 2007", Time, 4 August 2009
24. Gregory, Sean (24 August 2017). "How Kids' Sports Became a \$15 Billion Industry". Time. Retrieved 24 August 2017.
25. "135 mn saw World Cup final: TAM". Hindustan Times. 10 April 2011. Archived from the original on 3 August 2013. Retrieved 1 August 2013.
26. "Super Bowl XLIX was the most-viewed television program in U.S. history". Yahoo Sports. 2 February 2015. Retrieved 8 June 2015.
27. "Super Bowl most watched television show in US history". Financial Times. 2 February 2015. Retrieved 8 June 2015.
28. Mohammad, Sikender Mohsienuddin, Cloud Computing in IT and How It's Going to Help United States Specifically (October 4, 2019). International Journal of Computer Trends and Technology (IJCTT) – Volume 67 Issue 10 - October 2019, Available at SSRN: <https://ssrn.com/abstract=3629018>
29. "Super Bowl Sunday is a Worldwide American Football Holiday". American Football International Review. 1 February 2015. Retrieved 8 June 2015.
30. Markovits, Andrei; Rensmann, Lars (2010). Gaming the World: How Sports Are Reshaping Global Politics and Culture. p. 94. ISBN 9781400834662. Retrieved 8 June 2015.
31. "The White Paper on Sport". European Commission. Archived from the original on 16 September 2008. Retrieved 11 July 2007.
32. Freedman, Jonah. "Fortunate 50 2011". Sports Illustrated.
33. Eassom, Simon (1994). Critical Reflections on Olympic Ideology. Ontario: The Centre for Olympic Studies. pp. 120–123. ISBN 978-0-7714-1697-2.
34. "Olympic Athletes". Info Please. Retrieved 13 June 2015.
35. "What changed the Olympics forever". CNN. 23 July 2012. Retrieved 13 June 2015.
36. "Olympic boxing must remain amateur despite moves to turn it professional states Warren". Inside the Games. 13 August 2011. Retrieved 13 June 2015.
37. Grasso, John (2013). Historical Dictionary of Boxing. ISBN 9780810878679. Retrieved 13 June 2015.
38. "Olympic Wrestling Is Important for Pro Wrestling and Its Fans". Bleacher Report. 14 February 2013. Retrieved 13 June 2015.
39. Boys' Life. Boy Scouts of America, Inc. August 1988. p. 24. Retrieved 13 June 2015.
40. "Gaining Steam in Sports Technology". Slice of MIT. Archived from the original on 14 July 2014. Retrieved 3 January 2015.
41. "Hi-tech suits banned from January". BBC Sport. 31 July 2009. Retrieved 8 June 2015.

42. "Full Body Swimsuit Now Banned for Professional Swimmers". ABC News. 4 January 2010. Retrieved 8 June 2015.
43. FIFA (2012). "Testing Manual" (PDF). FIFA Quality Programme for Goal Line Technology.
44. "IFAB makes three unanimous historic decisions". FIFA. Retrieved 23 April 2015.
45. "Goal-line technology set up ahead of FIFA World Cup". FIFA. 1 April 2014. Retrieved 9 June 2015.
46. "Hawk-Eye confirmed as goal-line technology provider for Canada 2015". FIFA. 31 March 2015. Retrieved 2 June 2015.
47. "Goal-line technology: Premier League votes in favour for 2013–14". BBC. 11 April 2013. Retrieved 11 April 2013.
48. "Bundesliga approves Hawk-Eye goal-line technology for new season". Carlyle Observer. Retrieved 9 June 2015.
49. "NFL approves rule to change replay process". Business Insider. 20 July 2011. Retrieved 8 June 2015.