

Role of Artificial Intelligence and Sports Analytics for Sports Persons

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Abstract

Artificial Intelligence (AI) and sports analytics are game-changers in the world of sports, offering the potential to make data-driven decisions and optimize performance, prevent injuries, and tailor training strategies to individual athletes. In this study, we will explore how AI and sports analytics can be used to improve the performance and training effectiveness of athletes. The research design used was quantitative, descriptive and explanatory with the primary data obtained from 220 athletes of Telangana with different sports disciplines and competitive level by using a structured questionnaire. The instrument consisted of eight statements on a 5-point Likert scale which assesses athletes' perceptions of AI and sports analytics as well as demographic variables. Analysis of data collected was carried out using descriptive statistics, One-Sample t-test and Simple Linear Regression Analysis using SPSS Version 29.0. The results showed that most respondents had positive attitudes towards the use of AI and sports analytics to optimize sports performance, identify strengths and weaknesses, aid in decision making, minimize injury risk, and promote overall athlete development. The results from the One-Sample t-test showed that overall, athletes' perception of the role of AI and sports analytics compared to the neutral point was significantly higher with a t value of 23.62 and a p value of <0.001, indicating the positive impact of these technologies in enhancing sports performance. Moreover, regression analysis showed that, the use of AI was significantly associated with training effectiveness ($\beta = 0.782$, $R^2 = 0.611$, $p < 0.001$), accounting for 61.1% of the variance in training effectiveness. Overall, the study demonstrates that Artificial Intelligence and sports analytics are powerful tools in modern sports that can be used to great effect to benefit athletes, coaches, and sports organizations. Results give some real-world considerations for the promotion of AI-powered training systems and data-informed coaching practices to boost athlete performance and sports development outcomes.

Keywords: Artificial Intelligence, Sports Analytics, Athletes, Sports Performance, Performance Enhancement, AI Adoption etc.

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I. INTRODUCTION

In the era of data-driven decision making and scientific performance evaluation, Artificial Intelligence (AI) and sports analytics have emerged as transformative technologies that are reshaping the sports landscape. AI technology like as wearable fitness trackers, video analysis tools, machine learning algorithms, and performance monitoring systems are becoming vital for contemporary athletes and coaches to optimise training, analyse physical performance, avoid injuries, and improve tactical decision-making. In the era of data-driven athletics, these technologies provide essential and timely insights that may complement conventional coaching methods to enhance athletes' performance and provide a competitive advantage.

Given the pervasive use of AI across several sports, it is essential to understand players' opinions of AI. The applications of AI and sports analytics are many, including personalised training, performance improvement, and long-term athlete development; nevertheless, the efficacy of these tools significantly depends on athletes' receptivity and integration of new technologies. "The present research is to examine perspectives on the significance of Artificial Intelligence and sports analytics in enhancing sports performance and training effectiveness." Results will provide insights for athletes, coaches, sports organisations, and policymakers to facilitate the effective integration of AI-driven technology in modern sports training and performance management procedures.

II. REVIEW OF LITERATURE

Ghosh, Ramamurthy, Chakma, and Roy (2023)

carried out an extensive review on the application of Artificial Intelligence in sports analytics. The existing research was segmented into three broad areas: wearable and sensor technologies, computer vision and wireless/mobile-based application. It also looked at real time sports analytics through machine learning, deep learning, reinforcement learning, and statistical learning. The authors provided a conclusion that AI has a significant impact on improving athlete performance analysis, decision-making, injury monitoring, and personalized coaching, as well as highlighting areas for future research, such as explainable AI and intelligent sports systems.

Bonidia, Rodrigues, Avila-Santos, Sanches and Brancher (2018)

conducted a systematic literature review of computational intelligence in sports to analyze studies published from 2010 onwards. It was found that the use of data mining and machine learning techniques for performance prediction and talent identification, tactical analysis and match outcome forecasting has been steadily increasing in the review. The authors highlighted the importance of computational intelligence in helping coaches and sports organizations draw insights from vast amounts of sports data to inform performance.

Tuyls *et al.*,(2020) explored the evolving landscape of AI in football analytics, highlighting the application of AI tools like statistical learning, game theory, and computer vision in player assessment, tactical analysis, injury prevention, and strategic decision-making. Overall, the study revealed that AI has the potential to significantly enhance football performance, coaching decisions, and even open up new avenues for research in the field of Artificial Intelligence.

Kaluža, Košir *et al.*,(2024) conducted a systematic review of the use of real-time Artificial Intelligence in sports. The authors followed the PRISMA methodology to analyse studies which used wearable sensors and machine learning algorithms for monitoring athletes and providing real-time feedback. The review found that AI-powered systems have proven effective in enhancing movement analysis, optimizing training routines, and monitoring performance, as well as providing real-time coaching feedback and injury prevention measures. (Journal of Big Data, 2024).

Kiełtyka *et al.*,(2025) have performed a systematic review and meta-analysis of Artificial Intelligence applications in various sports. There was a consistent improvement in athlete performance evaluation, tactical analysis and training optimization using machine learning, deep learning and computer vision techniques, the study reported. The authors also found that deep learning models tended to be more

accurate at predicting; this indicates the growing importance of AI in evidence-based sports science.

III. OBJECTIVES OF THE STUDY

The general aims of the study are outlined as:

1. To investigate the demographic characteristics of the Sports persons in the study.
2. To gather athlete perceptions about the contribution of Artificial Intelligence and sports analytics for sports performance and development.
3. To assess the impact of Artificial Intelligence in Performance Enhancement of Sports.
4. To explore the connection between the use of Artificial Intelligence and the effectiveness of training for athletes.

IV. RESEARCH METHODOLOGY

4.1 Research Design

The research design used in the present study was a quantitative, descriptive and explanatory research to analyze the role of Artificial Intelligence (AI) and sports analytics in improving the performance and effectiveness of athletes. The survey was cross-sectional and the primary data was collected from the people who are involved in various sports. The quantitative design was ideal for measuring the perceptions of athletes on AI-based technologies and sports analytics through a systematic approach and allowing the testing of hypotheses using statistical methods.

4.2 Population and Sample

Target population was individual and team athletes in school, collegiate, state, national, international and professional sports. The final sample of athletes for the study included 220 Sports Persons of Telangana. The respondents were from all age groups, educational backgrounds, levels of participation and sporting disciplines, which provided a holistic view of athletes' perception of Artificial Intelligence and sports analytics.

4.3 Sampling Technique

Giving consideration to the knowledge and experience participants would need to have in order to answer the questions in an informed manner, a purposive sampling technique was used. The sampling strategy was used to obtain different levels of athletes from different sports.

4.4 Data Collection

The study adopted primary data that were gathered using a structured questionnaire that was both online and offline. The participation was voluntary and information regarding the academic purpose of the study was given to the respondents. The confidentiality and anonymity of the participants were ensured during the research process.

4.5 Research Instrument

The questionnaire consisted of two sections.

Section A gathered demographic data such as gender, age, educational qualification, type of sport, sport discipline, level of sport participation, number of years of sport participation, the use of AI based sport technologies and types of AI-based tools used.

In Section B, athletes' perceptions of the role of Artificial Intelligence and sports analytics were assessed using eight statements on a five-point Likert scale ranging from:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree

The questionnaire explored multiple facets of AI usage, such as performance improvement, strength and weaknesses identification, performance feedback, injury prevention, AI support in decision-making,

willingness to use AI technologies and AI integration in the coaching practice, and athlete development.

4.8 Statistical Tools Used

Data collected were coded, tabulated and analysed with the Statistical Package for the Social Sciences (SPSS), Version 29.0. For all inferential analyses, the level of statistical significance was set at 1% ($p < 0.01$).

- One-Sample t-test
- Simple Linear Regression Analysis.

The study posits that the adoption of Artificial Intelligence and sports analytics technologies can help athletes perform better, offer more precise performance data, make better informed training decisions, minimise risks of injury and improve athletes' athletic development. As such, the independent variable that affects athletes' perceived training effectiveness and performance improvement is the adoption of Artificial Intelligence.

V. ANALYSIS AND INTERPRETATION

5.1 Demographics of the Respondents

Table 1: Demographic Profile of the Respondents (N = 220)

Variables	Particulars	Frequency	Percentage (%)
Gender	Male	142	64.5
	Female	74	33.6
	Prefer not to say	4	1.9
	Total	220	100.0
Age	Below 18 years	18	8.2
	18–22 years	94	42.7
	23–27 years	61	27.7
	28–32 years	29	13.2
	Above 32 years	18	8.2
	Total	220	100.0
Highest Educational Qualification	Higher Secondary	42	19.1
	Undergraduate	98	44.5
	Postgraduate	54	24.5
	Diploma/Certificate	18	8.2
	Other	8	3.6
	Total	220	100.0
Type of Sport	Individual Sport	103	46.8
	Team Sport	117	53.2
	Total	220	100.0
Name of Sport	Cricket	48	21.8
	Football	32	14.5
	Athletics	28	12.7
	Badminton	26	11.8
	Volleyball	20	9.1
	Basketball	18	8.2
	Kabaddi	16	7.3
	Hockey	12	5.5
	Table Tennis	10	4.5
	Swimming	10	4.5
	Total	220	100.0

Level of Participation	School	26	11.8
	College/University	84	38.2
	State	52	23.6
	National	34	15.5
	International	12	5.5
	Professional League	12	5.5
	Total	220	100.0
Years of Playing Experience	Less than 2 years	32	14.5
	2–5 years	88	40.0
	6–10 years	67	30.5
	More than 10 years	33	15.0
	Total	220	100.0
Use of AI-Based Sports Technology or Sports Analytics Tools	Yes	158	71.8
	No	62	28.2
	Total	220	100.0
AI-Based Sports Technology/Analytics Tools Used* (Multiple Responses) (n = 158)	Wearable Fitness Trackers	112	70.9
	Performance Analysis Software	76	48.1
	Video Analytics	91	57.6
	AI Coaching Applications	64	40.5
	GPS Tracking Systems	58	36.7
	Other AI-Based Tools	19	12.0

Table 1 shows the demographic description of the 220 athletes who completed the survey. Data on the distribution of the participants according to their gender shows that most of the participants were male (64.5%), female (33.6%) and (1.9%) preferred not to disclose. This indicates that the study is largely male athlete-centred, but that a significant number of female athletes are included.

In terms of age, the majority of the respondents were in the age group 18-22 (42.7%) followed by 23-27 years (27.7%). The age range of the respondents was 28-32 years (13.2 %); 18 and below (8.2 %) and 32 and above (8.2 %). These findings suggest that the majority of the athletes in this study are younger athletes that are actively playing competitive sport and are more likely to embrace new technology.

Based on educational level, 44.5%, 24.5%, and 19.1% of the respondents were undergraduates, postgraduates, and higher secondary students, respectively. 8.2% of the respondents had a diploma or certificate and 3.6% were in the category 'Other'. The majority of the participants had a formal educational background, which could have a positive impact on their awareness and acceptance of Artificial Intelligence and sports analytics.

The distribution by type of sport indicates that 53.2% were engaged in team sports and 46.8% in individual sports, with a fairly even distribution of athletes engaged in various types of sport. Cricket had the largest share with 21.8 per cent followed by Football with 14.5 per cent, Athletics with 12.7 per cent, Badminton with 11.8 per cent, Volleyball with 9.1 per cent, Basketball with 8.2 per cent, Kabaddi with 7.3 per

cent, Hockey with 5.5 per cent and Table Tennis and Swimming with 4.5 per cent each. This diversity contributes to the overall applicability of the results in various sports.

As for the extent of participation, the largest percentage of respondents was for the College/University level (38.2%), followed by the State level (23.6%), National level (15.5%), School level (11.8%) and International level (5.5%) and Professional League (5.5%). Moreover, 40.0% of the athletes had a playing experience of 2-5 years and 30.5% of the athletes had a playing experience of 6-10 years. The majority of respondents, representing 15.0% with over 10 years of competitive experience and 14.5% with 10-2 years of experience, had enough competitive experience to inform their views on AI-based technologies.

The results also show that 71.8% of the respondents had implemented AI based sports technology or sports analytics tools before, while 28.2% of them never used such tools. Of the 158 respondents who said they were using AI-based tools, the most frequently used technology was Wearable Fitness Trackers (70.9%), followed by Video Analytics (57.6%), Performance Analysis Software (48.1%), AI Coaching Applications (40.5%) and GPS Tracking Systems (36.7%). A lesser percentage (12.0%) said other AI sports technologies were used. The responses suggest that the athletes are highly aware and embrace the use of AI-powered sports technologies, highlighting the increasing role of technology and data in modern sports training and performance management.

5.2 Role of Artificial Intelligence and Sports Analytics for Athletes

Table 2: Artificial Intelligence Helps Improve Sports Performance (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	8	3.6
Disagree	19	8.6
Neutral	39	17.7
Agree	96	43.6
Strongly Agree	58	26.4
Total	220	100.0

The respondents' perception about the role of Artificial Intelligence (AI) and sports analytics for improving athletes' performance and overall athletic development is presented in Tables 2 to 9. The results indicate a positive perception of using AI technologies in sports, with most individuals answering either 'Agree' or 'Strongly Agree' for each of the statements.

As shown in Table 2, 70.0% of the respondents agreed or strongly agreed that Artificial Intelligence contributes to enhancing sports performance. The responses were in contrast, with 17.7% being neutral and 12.2% disagreeing. This indicates that the majority of athletes feel that AI is an effective tool for improving a sports person's performance.

Table 3: Sports Analytics Assists in Identifying Strengths and Weaknesses (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	7	3.2
Disagree	16	7.3
Neutral	35	15.9
Agree	102	46.4
Strongly Agree	60	27.3
Total	220	100.0

Results in Table 3 indicate that 46.4% agreed that sports analytics helps to find out the strengths and weaknesses of athletes, while 27.3% strongly agreed, adding up to 73.7% positive responses. 15.9% had

neutral opinions with only 10.5% disagreeing. These findings suggest that athletes understand the importance of sports analytics in offering objective feedback and pinpointing areas for improvement.

Table 4: AI-Based Performance Analysis Provides More Accurate Feedback than Traditional Coaching Alone (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	10	4.5
Disagree	25	11.4
Neutral	48	21.8
Agree	86	39.1
Strongly Agree	51	23.2
Total	220	100.0

According to Table 4, 39.1% of the respondents agreed and 23.2% strongly agreed that AI-informed performance analysis offers more accurate feedback than traditional coaching alone, with a total agreement rate of

62.3%. Yet, 21.8% were neutral and 15.9% disagreed, indicating that while athletes value AI feedback, they also see the value in combined efforts between technology and traditional coaching.

Table 5: AI and Sports Analytics Help Reduce the Risk of Sports Injuries (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	13	5.9
Disagree	24	10.9
Neutral	49	22.3
Agree	84	38.2
Strongly Agree	50	22.7
Total	220	100.0

Results in Table 5 showed that 38.2% were in agreement and 22.7% were strongly in agreement that AI and sports analytics play a role in minimizing sports injuries, overall positive perception is 60.9%. In the meantime, 22.3% of the respondents were neutral and 16.8% disagreed. This is the case because injury

management is reliant on a number of physiological and environmental factors in addition to technological intervention, which could be why there is comparatively greater uncertainty regarding the effectiveness of AI in this area compared with the previous statements.

Table 6: AI Technologies Help Make Better Training and Competition Decisions (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	9	4.1
Disagree	17	7.7
Neutral	37	16.8
Agree	99	45.0
Strongly Agree	58	26.4
Total	220	100.0

As seen in Table 6, the respondents positively responded with 45.0% agreed and 26.4% strongly agreed that AI technologies are useful in making better decisions for training and competitions, which is a combined

response of 71.4%. 11.8% disagreed and 16.8% were neutral. These findings suggest that athletes feel that the insights from AI aid training and competition planning and performance optimization.

Table 7: Willingness to Use AI-Based Tools Regularly to Enhance Athletic Performance (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	6	2.7
Disagree	15	6.8
Neutral	33	15.0
Agree	104	47.3
Strongly Agree	62	28.2
Total	220	100.0

Table 7 indicates the athletes' acceptance of AI related technologies in the future. Most participants (47.3%) agreed, while 28.2% strongly agreed that they would use AI-based tools regularly to improve their performance in sports, with an overall agreement of

75.5%, which was the highest out of all the behavioural intention statements. The disagreement was only 9.5%, with 15.0% holding a neutral stance, suggesting a strong acceptance and willingness to integrate AI into their training practices.

Table 8: Coaches Should Integrate AI and Sports Analytics into Athlete Training Programmes (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	5	2.3
Disagree	14	6.4
Neutral	28	12.7
Agree	108	49.1
Strongly Agree	65	29.5
Total	220	100.0

Table 8 also shows there was considerable support for using Artificial Intelligence and sports analytics in coaching programmes. The combined positive response of 'agree' and 'strongly agree' was 78.6% (nearly half) while 8.7% disagreed and 12.7%

were neutral. These results indicate that there is a strong belief among athletes that AI should be used alongside traditional coaching methods to enhance the quality of training and performance outcomes.

Table 9: AI and Sports Analytics Positively Contribute to Athletes' Performance and Development (N = 220)

Response	Frequency	Percentage (%)
Strongly Disagree	5	2.3
Disagree	12	5.5
Neutral	27	12.3
Agree	111	50.5
Strongly Agree	65	29.5
Total	220	100.0

Finally, Table 9 displays the overall perception about the role of Artificial Intelligence and sports analytics in athlete's performance and development. Over half of the respondents (50.5%) agreed and 29.5% strongly agreed to the statement, which led to highest combined agreement (80.0%) among all the statements. While 12.3% were neutral, only 7.8% disagreed. This shows a high level of agreement in the positive role of AI and sports analytics in the development, performance, and long-term success of sports.

In summary, the results of Tables 2-9 showed that, generally speaking, the athletes have positive attitudes towards AI and sports analytics. The majority of positive responses to each of the statements reflects growing trust in AI powered technologies for performance optimisation, performance analysis, injury

management, coaching support, decision making and athlete development. The findings also indicate that AI tools in sports analytics are increasingly becoming a part and parcel of sports training and are considered useful for enhancing athletes' performance and competitiveness.

5.3 Hypothesis Testing

H₀: Artificial Intelligence and sports analytics do not have a significant positive effect on athletes' performance enhancement.

H₁: Artificial Intelligence and sports analytics have a significant positive effect on athletes' performance enhancement.

A One-Sample t-test was performed to test this hypothesis, comparing the overall mean perception score to the neutral score of 3.00 on the five-point Likert scale.

Table 10: One-Sample t-test Showing the Effect of AI and Sports Analytics on Athletes' Performance (N = 220)

Variable	Test Value	Mean	SD	t-value	df	Sig. (2-tailed)	Decision
Overall Perception towards AI and Sports Analytics	3.00	3.97	0.61	23.62	219	0.000**	Reject H ₀₁

Significant at $p < 0.01$

The mean perception score ($M = 3.97$, $SD = 0.61$) is significantly higher than the neutral value of 3.00 ($t = 23.62$, $p < 0.001$). Thus, the null hypothesis is rejected and the alternative hypothesis accepted. "Results show that athletes believe the use of Artificial Intelligence and sports analytics has a strong positive impact on their sports performance."

H₀: There is no significant relationship between athletes' adoption of Artificial Intelligence and sports analytics tools and the effectiveness of their training.

H₂: There is a significant positive relationship between athletes' adoption of Artificial Intelligence and sports analytics tools and the effectiveness of their training.

A Simple Linear Regression analysis was carried out.

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	0.782	0.611	0.609	0.487

Table 12: ANOVA for Regression Model

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	82.48	1	82.48	347.56	0.000**
Residual	51.76	218	0.237		
Total	134.24	219			

Significant at $p < 0.01$.

Table 13: Regression Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
Constant	1.186	0.141	—	8.41	0.000
AI Adoption	0.706	0.038	0.782	18.64	0.000**

Dependent Variable: Training Effectiveness.

The regression model has statistical significance ($F = 347.56$, $p < 0.001$). The model explains 61.1% of the variation in training efficacy ($R^2 = 0.611$) associated with AI adoption. The use of AI significantly enhances training efficacy, shown by a coefficient of 0.782 and a t statistic of 18.64, yielding a p value below 0.001. Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted.

VI. CONCLUSION

The convergence of Artificial Intelligence and Sports Analytics is progressively influencing the sports sector, providing insights for data-informed training, performance evaluation, and strategic decision-making. The findings of the current research indicate that sports professionals do not have a negative disposition towards the use of AI-based technologies for enhancing performance, identifying strengths and shortcomings, delivering performance feedback, preventing injuries,

and advancing their sport. The demographic research indicated that most respondents were familiar with or actively using AI in sports technology, underscoring the significant adoption of digital technologies in contemporary sports. The results of the hypothesis testing provide robust empirical proof that Artificial Intelligence and sports analytics are effective in sports. The One-Sample t-test indicated a substantial beneficial influence of AI and sports analytics on athletes' performance enhancement, while the Simple Linear Regression demonstrated a strong correlation between AI adoption and training efficacy. The findings suggest that the use of AI technology generally enhances training outcomes and athlete development. Consequently, coaches, sports organisations, educational institutions, and policymakers have to advocate for the incorporation of AI-driven technologies in coaching and performance management methodologies. Advanced sports technologies, athlete 173ptimizing, and digital skill enhancement will persist in facilitating evidence-based coaching and 173ptimizing potential in an increasingly technology-oriented sports landscape via sustained investment.

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