Application of Information Systems for Performance, Management and Commerce in Physical Education and Sports

Dr. I. M. Makkubhai[1], Dr.Pushpa.M. Danganavar[2]
[1]*M.P.Ed., M.A, D.C.A., D.Y.Ed., N.I.S., M.Phil., Ph.D., Ph.D., Associate Director, Head Department of Physical Education and Sports, Nehru Arts Science and Commerce Degree College Hubballi Karnataka India*
[2]*M.Com., B.Ed., (Ph.D.), Principal, A.G.M. Arts and Commerce Degree College Varur Hubballi Karnataka India*

Abstract- The rapid evolution of information and communication technologies has significantly reshaped the landscape of physical education and sports. Information systems now play a vital role in enhancing athletic performance, streamlining organizational management and expanding commercial opportunities within the sports sector. This research paper examines the application of information systems across three key dimensions: sports performance, management and commerce. The study focuses on how digital tools such as Sportsperson management systems, performance analytics platforms, learning management systems and sports information databases contribute to systematic data collection, analysis and decision making.

In the context of sports performance, information systems enable accurate monitoring of training load, fitness parameters, injury prevention and skill development, leading to improved performance outcomes and evidence based coaching practices. From a management perspective, these systems support efficient planning, scheduling, record maintenance, evaluation and communication within physical education institutions and sports organizations. This also explores the growing influence of information systems in sports commerce, including digital marketing, online ticketing, sponsorship management, fan engagement platforms and e-commerce applications, which have enhanced revenue generation and market reach.

The integration of information systems offers several advantages such as improved accuracy, real time access to data, transparency, operational efficiency and enhanced stakeholder interaction. However, challenges including high implementation costs, data security concerns, technological skill gaps and resistance to change remain significant barriers to widespread adoption. The study concludes that the strategic and effective implementation of information systems is essential for sustainable development, competitive performance and commercial growth in modern physical education and sports environments.

Keywords: Information Systems, Sports Performance, Physical Education Management, Sports Analytics, Sports Commerce

I. INTRODUCTION

The integration of information systems has become a transformative force across multiple sectors, including education, healthcare, business, and sports. In the field of physical education and sports, the increasing complexity of performance evaluation, organizational management, and commercial operations has created a strong demand for efficient, data-driven technological solutions. Information systems provide structured methods for collecting, processing, storing and analyzing large volumes of data, thereby enabling informed decision-making and improved operational effectiveness.

Traditionally, physical education and sports management relied heavily on manual record keeping, observational assessments and experience-based judgments. While these approaches contributed to foundational development, they often lacked accuracy, consistency and scalability. With the emergence of digital technologies, sports institutions, educational organizations, and professional teams have begun adopting information systems to enhance athlete performance monitoring, training optimization, and administrative efficiency. Tools such as athlete management systems, performance analytics software and learning management platforms have enabled

systematic tracking of physical, physiological and psychological parameters.

Information systems also play a crucial role in sports management by supporting planning, scheduling, resource allocation and performance evaluation at institutional and organizational levels. In physical education settings, digital platforms facilitate curriculum delivery, assessment management and student engagement, while ensuring transparency and accountability. For sports organizations, integrated management systems improve coordination among coaches, administrators, medical staff and athletes, leading to more cohesive and effective operations.

In addition to performance and management, the commercial dimension of sports has expanded significantly due to globalization and digitalization. Information systems support sports commerce through online ticketing, digital marketing, sponsorship management, fan engagement platforms and e-commerce solutions. These technologies enable sports organizations to reach wider audiences, enhance revenue generation and strengthen stakeholder relationships. The application of information systems has therefore become essential not only for athletic excellence but also for financial sustainability and competitive advantage.

Despite the growing adoption of information systems in physical education and sports, challenges such as technological infrastructure limitations, data security concerns, high implementation costs and resistance to change persist. Understanding the scope, benefits and limitations of these systems is critical for their effective utilization.

Objectives

Therefore, this paper aims to examine the application of information systems in sports performance, management and commerce, highlighting their impact on efficiency, effectiveness and overall development within the physical education and sports ecosystem.

II. RESEARCH METHODS

Research Design

The study adopts a descriptive and analytical research design to examine the application of information systems in physical education and sports, with specific emphasis on performance enhancement, organizational management and commercial activities. A mixed methods approach was employed, integrating both qualitative and quantitative data to provide a comprehensive understanding of the subject.

Data Sources

Data for the study were collected from both primary and secondary sources. Primary data were obtained through structured questionnaires and semi structured interviews administered to physical education teachers, sports administrators, coaches and management personnel from educational institutions and sports organizations of dharwad district. Secondary data were sourced from academic journals, conference proceedings, books, institutional reports, government publications and credible online databases related to sports management and information systems.

Sampling Technique and Sample Size

A purposive sampling technique was used to select respondents who actively utilize or manage information systems in physical education and sports environments. The sample included professionals with practical experience in sports performance analysis, institutional management and sports commerce. A total of N = respondents participated 72 in the study.

Data Collection Instruments

The primary data collection instrument was a structured questionnaire designed to assess the usage, effectiveness and challenges of information systems in sports performance, management and commerce. The questionnaire consisted of closed ended questions measured on a five-point Likert scale, along with a limited number of open-ended questions to capture qualitative insights. Interviews were conducted to supplement quantitative findings and gain deeper contextual understanding.

Data Analysis Techniques

Quantitative data were analyzed using descriptive statistics, including percentages, mean scores and standard deviations. Qualitative responses were analyzed through thematic analysis to identify recurring patterns and key issues related to system implementation and utilization. The results were

presented using tables and graphical representations for clarity and interpretation.

Ethical Considerations

Ethical standards were maintained throughout the study. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality of data was ensured. The collected information was used strictly for academic research purposes.

III.INTERPRETATION AND DISCUSSION

The findings of the study indicate a growing integration of information systems across physical education and sports institutions, particularly in the areas of performance analysis, administrative management and commercial operations. The responses from coaches, physical education professionals and sports administrators suggest that digital tools have become essential for improving efficiency, accuracy and strategic decision-making.

Information Systems and Sports Performance

The analysis revealed that information systems are widely used for monitoring athlete performance, training load management, fitness assessment and injury prevention. Respondents reported improved precision in performance evaluation due to real time data collection and analytical tools. The use of athlete management systems and performance analytics software enables coaches to make evidence-based decisions, optimize training programs, and track long term athlete development. These findings support the view that information systems enhance coaching effectiveness by reducing reliance on subjective assessment methods.

Role in Physical Education and Sports Management

In the area of management, the study shows that information systems significantly improve organizational planning, scheduling, record maintenance, and communication. Physical education institutions utilizing digital management platforms reported higher levels of transparency and accountability. The centralized storage of academic, administrative and sports-related data reduced duplication of work and minimized human error. These results indicate that information systems contribute to systematic management practices and strengthen institutional governance.

Impact on Sports Commerce

The study further highlights the expanding role of information systems in sports commerce. Digital marketing tools, online ticketing systems, sponsorship databases and fan engagement platforms were found to enhance revenue generation and market reach. Respondents noted that information systems enable better customer relationship management and data-driven marketing strategies, thereby increasing commercial sustainability for sports organizations.

Challenges and Limitations

Despite the positive outcomes, the study identified challenges such as high implementation costs, lack of technical expertise, data security concerns, and resistance to technological change. These barriers were particularly evident in smaller institutions with limited infrastructure. The findings suggest the need for capacity building, training programs and policy support to ensure effective adoption.

Overall Interpretation

Overall, the results confirm that information systems play a critical role in advancing performance excellence, managerial efficiency, and commercial growth in physical education and sports. Strategic integration of these systems is essential for achieving sustainable development in the modern sports ecosystem.

IV. FINDINGS

1. The study found that information systems are increasingly adopted in physical education and sports institutions for monitoring athlete performance, managing training schedules and maintaining performance records.
2. The use of performance analytics and athlete management systems improved accuracy in evaluating physical, physiological, and skill-based parameters, leading to more informed coaching decisions.
3. Information systems significantly enhanced administrative efficiency by streamlining planning, scheduling, record-keeping and

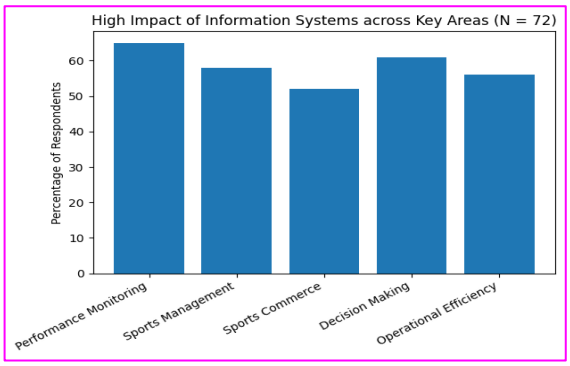
communication among coaches, administrators and support staff.

4. Digital platforms and learning management systems were found to support effective delivery of physical education curricula, assessment processes and student engagement.
5. The study revealed that information systems play a vital role in sports commerce by facilitating online ticketing, digital marketing, sponsorship management and fan engagement, contributing to increased revenue opportunities.
6. Real-time data access and centralized information storage improved transparency, accountability, and decision-making within sports organizations.
7. Despite the benefits, challenges such as high implementation costs, limited technical expertise, inadequate infrastructure and data security concerns were identified as major barriers to effective utilization.
8. Smaller and resource-constrained institutions showed lower levels of adoption compared to well-founded organizations, highlighting disparities in technological access.
9. Training and capacity-building initiatives were found to be essential for maximizing the effectiveness of information systems in physical education and sports.
10. Overall, the findings indicate that strategic integration of information systems positively influences sports performance outcomes, managerial effectiveness and commercial sustainability.

V. RESULTS

The results of the study demonstrate a strong and positive impact of information systems on physical education and sports across performance, management and commercial domains. Quantitative analysis revealed that a majority of respondents reported improved accuracy and efficiency in athlete performance monitoring through the use of digital performance analytics and athlete management systems. Enhanced data availability enabled coaches to design evidence-based training programs and monitor athlete progress more effectively.

Figure 1: High Impact of Information Systems across Key Areas (N = 72)



In terms of management, the findings indicate that institutions utilizing information systems experienced improved administrative coordination, efficient scheduling, systematic record keeping and enhanced communication among stakeholders. Learning management systems and digital administrative platforms supported transparency, reduced manual workload and minimized operational errors. The results further show that organizations adopting integrated information systems demonstrated higher levels of organizational effectiveness compared to those relying on traditional methods.

Table 1: Respondents' Perception of Impact of Information Systems (N = 72)

Area of Application	High Impact (%)	Moderate Impact (%)	Low Impact (%)
Performance Monitoring	65	25	10
Sports Management	58	30	12
Sports Commerce	52	33	15
Decision Making	61	27	12
Operational Efficiency	56	31	13

Regarding sports commerce, the results highlight that information systems significantly contributed to improved revenue generation and market outreach. Digital marketing tools, online ticketing platforms, and sponsorship management systems enabled sports organizations to engage wider audiences and implement data driven commercial strategies. However, the results also reveal challenges such as high implementation costs, limited technical expertise, infrastructure constraints and data security concerns, particularly among smaller institutions.

Table 2: Overall Benefits Identified by Respondents

Benefit Identified	Percentage (%)
Improved performance analysis	67
Efficient administrative management	62
Better decision making support	60
Enhanced commercial opportunities	54
Increased transparency and accountability	58

The study concludes that information systems have become an indispensable component of modern physical education and sports. Their application enhances athletic performance through precise monitoring and analysis, strengthens management efficiency through systematic administrative processes, and supports commercial growth through digital engagement and revenue-oriented platforms. Despite certain challenges, the benefits of information system integration outweigh the limitations when supported by proper infrastructure, training, and policy frameworks. The paper emphasizes the need for strategic planning, capacity building and investment in digital technologies to ensure sustainable development and competitiveness in the physical education and sports sector. Future research may focus on advanced technologies such as artificial intelligence and big data analytics to further optimize sports performance and organizational outcomes.

REFERENCES

Journal Articles & Academic Sources

[1] Blobel, T., Rumo, M., & Lames, M. (2021). Sports Information Systems: A Systematic Review. International Journal of Computer Science in Sport.

[2] Kalantarli, N. M., Aliyeva, S. F., & Kerimli, İ. T. (2021). Role of Information Technologies in Sport Management. Scientific News of Academy of Physical Education and Sport.

[3] Varmus, M., Kubina, M., Mičiak, M., & Šarlák, M. (2024). Integrated Sports Information Systems: Enhancing Data Processing and Information Provision for Sports in Slovakia. Systems.

[4] Soedjatmiko, A. N., Sastaman, P., Mashud, & Nasrulloh, A. (2025). The Role of Big Data Analytics in Sport: Sports Data Mining. Journal of Coaching and Sports Science.

[5] Design and Application of Major Sports Events Management Information System Based on Integration Algorithm. Computational Intelligence and Neuroscience. (2022).

[6] Research on Physical Education Teaching Management Based on "Internet+" Platform. International Journal of Healthcare Information Systems and Informatics. (2025).

[7] Information Communication and Technology in Sports: A Meticulous Review (Reyaz et al., 2023). Frontiers in Sports and Active Living.

Books / Book Chapters

[1] Mahmoud, A. B. (2024). Digital Marketing Analytics in Sports. *In* Sports Analytics: Data-Driven Sports and Decision Intelligence. Springer.

[2] Martin, L. (2016). Sports Performance Measurement and Analytics. Pearson FT Press (cited in IJARSCT).

Journals & Conference Sources

[1] International Journal of Sports Marketing & Sponsorship — a peer-reviewed journal covering technology, marketing, and commerce aspects of sport.

[2] Journal of Management Information Systems — leading journal on information systems theory and practice (useful for IS foundation).

Websites & Online Platforms

[1] Sportdata: Sports Event Management Software & Information Systems — details real-world applications of IS tools in event management.

[2] Match Analysis Technologies — example of performance analytics software in sports.