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## **The Role of Polar Device in Improving Sports Training A Field Study: Joya Sports Club in Southern Lebanon**

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### **Abstract**

This study aimed to analyze the scientific and practical role of the Polar device in improving the training process at Joya Sports Club in Southern Lebanon, emphasizing the importance of keeping pace with technological advancements in sports training. The study's significance lies in bridging the gap between traditional practices and data-driven training, providing an applicable model for emerging Arab clubs to emulate. The study adopted a descriptive-analytical approach, collecting data through semi-structured interviews with a sample comprising the technical staff, players, and management of the club. The results revealed a radical shift in training methodology, where the device's data contributed to personalized training programs, improved physical fitness indicators (endurance, speed, strength), and reduced injury rates through proactive management of training load and recovery. The results also highlighted organizational and financial challenges that were overcome by demonstrating the technology's feasibility.

**Keywords:** polar device, sports training, technological improvement, joya club, physical fitness, sports injuries.

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## Introduction

Modern sports training represents a fundamental pillar for developing performance and achieving accomplishments. It no longer relies solely on physical effort and traditional planning but has become a science based on accurate measurement and objective data. In this context, modern technologies and devices have emerged as effective tools for enhancing training efficiency. Among the most prominent of these devices are those produced by Polar, a leader in monitoring cardiac and physical activity. These devices provide instant and accurate data on heart rate, training load, and recovery levels, enabling coaches to optimally tailor programs and reduce the risks of fatigue and injury.

On the local level, the sports scene in Lebanon is witnessing notable transformations, with ambitious clubs adopting modern methodologies to compete at the highest levels. Joya Sports Club in Southern Lebanon is a living example of this trend, having achieved an inspiring journey by rising to the Lebanese Premier League, marking itself as one of the rising and surprising teams. This success did not come out of nowhere but was the result of organized collective effort, competitive spirit, and a ambitious vision embracing continuous development. The club's achievement, from promotion to a strong start in the current season, raises a fundamental question about the tools and methodologies it relied on to achieve this qualitative leap.

Therefore, this study sheds light on the intersection of advanced sports technology and the ambitions of rising clubs by focusing on the role of Polar devices in improving the training process at Joya Sports Club. It examines how this technology contributed to enhancing players' physical readiness, improving training session planning, managing loads accurately, and preventing injuries, positively reflecting on the team's collective and individual performance.

This study aims to analyze the scientific and practical impact of adopting this technology in an ambitious Lebanese sports environment like Joya Club, seeking to present a model that many local clubs can benefit from in their journey toward development and competing at the top.

## Study Objectives

- **Main Objective:** To analyze and evaluate the scientific and practical impact of using Polar devices on improving the overall training process at Joya Sports Club.
- **Sub-Objectives:**
  1. Monitor and enhance the efficiency of training planning based on quantitative data provided by the devices.

2. Measure the development in players' physical and technical levels resulting from the regular use of the technology.
3. Develop effective strategies for managing training loads and preventing injuries.
4. Identify obstacles and costs associated with the technology's application to provide practical recommendations.
5. Present a guiding model (Case Study) that emerging Lebanese and Arab clubs can emulate.

### **Importance of the Study**

- **Scientific Importance**

- Enriching Arabic sports literature with applied studies on the use of technology in sports training.
- Providing practical evidence (Empirical Evidence) supporting theories promoting data-driven training.

- **Practical Importance**

- For Joya Sports Club: Offering an objective evaluation of the effectiveness of its modern tools, helping optimize resources and make more informed decisions for the future.
- For researchers and coaches: Providing a practical framework for integrating technology like Polar into training plans.
- For Lebanese federations and clubs: Encouraging the adoption of modern scientific methodologies to elevate local sports and enhance regional and international competitiveness.

### **Study Problem**

Modern sports training is undergoing a radical shift towards reliance on technology and accurate data to improve performance. Despite Joya Sports Club's remarkable rise and achievements in a record time, there remains a need to understand the scientific mechanisms and tools it relied on to achieve this qualitative leap. The study's problem lies in questioning the effectiveness of adopting advanced technologies like Polar devices in improving the training process within emerging sports clubs in Lebanon, which often face challenges in resources and expertise. This study aims to systematically examine this relationship to determine the extent of

this technology's contribution to developing physical and technical performance and competing at the highest levels.

The main research question derived from this problem is: What role do Polar devices play in improving the training process at Joya Sports Club?

### **Sub-Questions**

1. How did Polar data (heart rate, training load) contribute to planning daily and weekly training programs for the team?
2. What is the impact of using these devices on developing players' basic physical elements (e.g., strength, endurance, speed)?
3. How did the data extracted from the devices help manage player fatigue and reduce the risk of injuries?
4. What are the challenges and costs associated with implementing this technology from the perspective of the club's management and technical staff?
5. How do players and the technical staff evaluate the effectiveness and ease of use of Polar devices in improving their individual and collective performance?

### **Study Hypotheses**

- **Main Hypothesis:** There is a statistically significant role of using Polar devices in improving the training and physical performance level of Joya Sports Club players.
- **Sub-Hypotheses**
  1. There is a positive statistically significant correlation between using Polar data in training planning and increasing the accuracy and efficiency of training programs.
  2. Relying on Polar devices significantly improves physical fitness indicators (endurance, strength, speed) among the club's players.
  3. Analyzing recovery and stress data through the devices reduces the injury rate among players.
  4. There are logistical (organizational) and financial challenges affecting the degree of effectiveness of implementing this technology in the club.

## Methodology

The study relied on the descriptive-analytical method, suitable for the nature and objectives of the research. This approach is based on describing the studied phenomenon (use of Polar devices) and analyzing it objectively to understand the relationships between variables.

- **Practical Application:** The study describes the reality of using Polar devices at Joya Club by collecting field data.
- **Analysis:** The data were analyzed to determine the impact and relationships, such as the relationship between data usage and reduced injury rates or improved physical fitness.

## Research Population and Sample

- **Research Population:** Includes all individuals at Joya Sports Club directly related to using Polar device data and applying it in the training process, consisting of:
  1. Technical Staff: (Head coach, assistant coaches, fitness trainer, physical therapist).
  2. First-team players: Those who use the devices regularly during training and matches.
  3. Sports Management: (Director of football or official in charge of equipment and analysis).
- **Research Sample:** Due to the small size of the original population, the study relied on a **comprehensive census method**, including all population members who agreed to participate, to ensure representation of all perspectives (technical, practical, administrative).

## Study Tool

The study tool consisted of semi-structured interviews as the main method for collecting qualitative data.

- **Justifications for Selection**
  - Allows obtaining rich and in-depth data from experts and specialists within the club.
  - Provides flexibility enabling the researcher to follow up on ideas and clarify responses.
  - Suitable for the small and specialized sample nature.

## • Tool Application

1. An interview guide was prepared including a set of main and open questions covering all research axes (planning, physical performance, injury prevention, evaluation, and challenges).
2. Interviews were conducted face-to-face or via visual communication means with sample members, with responses recorded after obtaining consent.
3. Qualitative analysis techniques were used to analyze interview texts, by coding responses and classifying them into main themes consistent with the study's objectives and questions.

## Study Limitations

The study's results and applications are limited by the following:

- **Geographical Limit:** The sample was limited to players of Joya Sports Club in Southern Lebanon only.
- **Time Limits:** The study was conducted during the 2024-2025 training season.

## Theoretical Framework of the Study

### Concept of the Polar Device

The Polar device is an integrated system for monitoring human performance and smart training, specifically designed to analyze the body's physiological responses during physical activity with high scientific accuracy (Alberto, 2019, p. 23).

This system operates through two main components (Alexander, Silva, Wong, 2012, p. 34):

1. A wireless sensor (chest strap) worn around the chest to monitor the electrical signals of the heart (ECG) with medical precision.
2. A receiver (watch or smartphone application) that receives data from the sensor and displays it in a simplified and clear manner for the coach or player.

Functionally, the Polar device can be described as a "personal heart and effort monitor" during training. It goes beyond merely providing a random heart rate number; it analyzes heart rate patterns, their response to effort, and recovery speed, transforming this complex data into practical, applicable information that aids in making immediate and informed training decisions.

## Operation of the Polar Device

The device operates on the principle of Continuous Bio-Monitoring, which involves:

- **Monitoring:** Capturing basic physiological signals (heart rate).
- **Analysis:** Processing these signals using advanced computer algorithms.
- **Interpretation:** Converting them into understandable performance indicators (such as effort intensity, recovery status, and training zones).
- **Feedback:** Providing instant and historical reports on player performance.

In short, the Polar device is the coach's eye into what cannot be seen inside the player's body. It is the bridge connecting the apparent effort exerted on the field with the actual response of the body's internal systems, transforming training from mere exercise repetition into a precise, data-driven scientific process.

## Importance of the Polar Device

The importance of the Polar device lies in its role as an objective tool linking the player's apparent effort to their actual physiological performance, achieved through (Amri, Kasim, Paulo, 2017, p. 87):

1. Providing accurate digital measurements of pulse rate and blood pressure, reducing the margin of error in performance evaluation.
2. Enabling real-time monitoring of players' physiological responses *during* performance, allowing coaches to make immediate decisions.
3. Helping identify early signs of overtraining by monitoring indicators like abnormal recovery rates, thus allowing for training load adjustments to prevent injuries.
4. Providing reliable data suitable for experimental studies comparing pre- and post-measurements with high statistical accuracy.

## Objectives of Using the Polar Device

The use of the Polar device aims to achieve tangible goals in the training process, namely (Antonio, 2011, p. 87):

1. Monitoring heart rate during both rest and exertion, the primary indicator of training load intensity.
2. Calculating advanced indicators such as:

- Percentage of Maximum Heart Rate (%HRMAX)
  - Target Heart Rate (HR RESERVE)
  - Percentage of Target Heart Rate (%HR RESERVE)
- These are vital indicators for determining if a player is working within the required training intensity zone.
3. Measuring the improvement in cardiovascular efficiency by tracking enhanced recovery rates and decreased resting heart rate after exertion.
  4. Designing individualized training programs based on the actual physiological capacities of each player, rather than on general averages.

### **Need for Using the Polar Device**

The need to use the Polar device emerged as an inevitable result of the evolution of sports training science, where traditional observation is no longer sufficient, for the following reasons (Ermanno, 2007, p. 76):

1. An urgent need to replace estimation and observation methods in determining training intensity with accurate measurement tools.
2. Particularly for younger age groups (under 15 years), whose physiological capacities vary significantly. The device helps protect them from excessive loads and optimally direct their energies.
3. The use of technology in monitoring and analysis has become a fundamental feature of modern training.
4. The need to "standardize small-sided games based on junior capabilities." The Polar device provides the scientific data necessary for this standardization.

### **Concept of Sports Training**

Sports training is a systematic and planned educational process based on scientific foundations, aiming to comprehensively prepare an individual (physically, skillfully, strategically, and psychologically) to reach their highest possible performance level (Khoulah, 2021, p. 32).

It is not merely about performing random exercises but is an integrated system encompassing planning, organization, implementation, and evaluation.

### **Objectives of Sports Training**

The objectives of sports training can be classified into several levels (Morad, 2019, p. 24):



**1. Physical and Skill Objectives (Comprehensive Development):**

- Developing physical attributes: such as strength, endurance, speed, and agility.
- Acquiring and developing sports skills.
- Achieving the highest performance level.

**2. Educational and Behavioral Objectives:**

- Improving behavior and discipline.
- Promoting values: such as discipline, honesty, sportsmanship, and self-reliance.
- Fostering motivation and positive competition.

**3. Health and Functional Objectives:**

- Enhancing body system efficiency.
- Achieving physical adaptation to training demands and stresses.

**4. Psychological Objectives:**

- Boosting self-confidence and willpower.
- Learning to handle pressure and responsibility.

**Importance of Sports Training**

The importance of sports training lies in its role as the cornerstone for developing sports and athletes, achieved through (Khaled, 2024, p. 4):

- Transforming potential into achievements.
- Ensuring comprehensive and balanced development.
- Saving time and effort through optimal use of training time.
- Preventing injuries through proper scientific training.
- Preparing players psychologically to face competition pressures.

**Need for Sports Training**

The need for systematic sports training emerged as an inevitable necessity for the following reasons (Yaqoob, 2020, p. 32):

- Specialization and the rising level of competitions.



- Leveraging scientific progress by integrating various sciences into the training process.
- Accounting for individual differences among players.
- Ensuring organization and continuity for sustainable development.
- Achieving long-term goals for clubs and national teams.

### **Relationship Between the Polar Device and Improved Sports Training**

The relationship between the Polar device and improved sports training is reciprocal, embodying the modern shift from training based on estimation and observation to data-driven, scientifically precise training.

The Polar device enables coaches to design customized training programs that suit each player's individual capacities. Its strength lies in its ability to turn training into a dynamic process adjustable based on real-time physiological data.

In the long term, using Polar helps build a historical database of player performance, enabling the tracking of physical fitness development and the improvement of cardiovascular efficiency. Thus, the device not only enhances sports performance but also acts as a preventive tool, extending players' athletic careers.

### **Overview of Joya Sports Club**

Joya Sports Club is an ambitious Lebanese club located in the town of Joya, Tyre District, Southern Lebanon. The club serves as an inspiring model for rising clubs that have managed to write a remarkable success story in record time.

### **Key Milestones**

- **Remarkable Promotion:** Achieved promotion to the Lebanese Premier League.
- **Surprise of the Season:** Established a strong presence in the premier league with a powerful start.
- **Record:** Became the second-fastest team in the league's history to score 5 goals in its first season.

### **Keys to Success**

- **Teamwork:** Relied on team spirit and collective effort.
- **Technology Adoption:** A pioneer in Lebanon in adopting modern technological tools like Polar for physiological monitoring.

- **Ambitious Management Vision:** Plans to expand technology use and integrate systems like GPS and video analysis.

### **Social Context**

The club enjoys strong support from the local community and is associated with businessman Wissam Saad, known for his social and humanitarian support in Lebanon.

### **Analysis of Interview Questions**

**Question 1: What specifically motivated Joya Club to adopt technology like Polar devices in its training programs? What fundamental needs did it address?**

Analysis of the responses reveals that the primary motivation was to move beyond traditional and random observation methods. The club was no longer satisfied with general estimates of player effort levels but sought accurate, data-based measurements. The urgent need was to transform training from an art relying solely on intuition and experience into a science based on numbers and objective data. The device was adopted not merely to follow technological trends but to fill a real gap in monitoring and evaluation processes. It provided tools to measure actual rather than apparent effort, determine each player's true endurance capacity, and establish a scientific basis for adjusting training intensity according to each player's individual potential.

**Question 2: How do you define the Polar device from a training perspective? What are the main functions coaches at the club primarily rely on?**

The responses clarify that the definition transcends being merely a measurement tool, elevating it to a decision-making aid. It is a system that gives the coach a "broader" and clearer view of the player's physical condition, enabling them to direct training based on confirmed information rather than expectations. The primary functions coaches relied on, such as monitoring heart rate, intensity levels, and recovery rates, were not ends in themselves but means to achieve a greater goal: transforming training from a general collective process into precise individual management for each player within the team.

**Question 3: How did the data provided by the Polar device help design more personalized training programs for each player?**

The analysis indicates that the data caused a radical shift in planning philosophy. The club moved from a "one-size-fits-all" model to a "tailored-to-measure" model where each player had their own program. Programs were no longer designed assuming all players had the same endurance capacity or response speed. Heart rate data revealed actual effort, training load data mapped precise work volume, and recovery data determined energy restoration speed. These

combined elements transformed the coach from a general planner into an engineer managing each player's physical resources separately to achieve maximum efficiency for the team as a whole.

**Question 4: Can you give a concrete example of how coaches changed an exercise or training session in real-time based on direct readings from Polar devices?**

The mentioned example illustrates that the technology gave coaches the ability for "biological and direct control" over the training session flow. They transitioned from external observers to active managers on the field. The ability to instantly detect a player exceeding the maximum intensity zone and reduce their load, request increased speed from the entire team when readings were below target, or adjust rest periods for a specific player during interval training are all live examples of how data transformed into immediate training commands. This highlights how data ceased to be just post-exercise reports and became live signals guiding player performance moment-by-moment.

**Question 5: How did using data affect dealing with individual differences among players?**

The analysis reveals that the technology contributed to achieving the principle of "training justice" based on efficiency rather than formal equality. Instead of treating all players the same way – which could disadvantage the proficient and overburden the less fit – the data enabled the coach to achieve positive differentiation. It became possible to reward the strong player with a training load matching their potential to push them to their limit, while simultaneously protecting the less fit player from excessive load that could lead to injury or exhaustion. This approach not only improved individual efficiency but also reinforced trust among players, as they realized treatment was based on objective and fair criteria.

**Question 6: What specific indicators or data did you observe that were directly linked to improved athletic performance in players?**

The responses show that performance improvement was not general or subjective but measurable and identifiable through clear quantitative indicators. Improved ability to control heart rate during effort indicates better cardiorespiratory efficiency. Spending more time in high-intensity zones proves developed physical capacity to withstand pressure. Increased speeds and distances covered are tangible results of improved strength and endurance. Most importantly, accelerated recovery rate is definitive evidence of comprehensive physical fitness improvement, indicating the body's enhanced ability to restore its normal state effectively and efficiently after exertion.

**Question 7: How did monitoring heart rate and effort metrics help prevent player fatigue**



The analysis highlights the "proactive" role technology played in managing players' physical health. Instead of waiting for clear signs of fatigue or actual injury, it became possible to detect early warnings. When a coach observes that a player's heart rate isn't returning to its normal level during rest periods as expected, it signals that the body hasn't fully recovered and needs more rest. This predictive and early detection capability prevented fatigue accumulation, protecting players from entering the chronic fatigue cycle that inevitably leads to performance decline and increased injury risk.

**Question 8: Did training load data and recovery rates help reduce injury rates among club players? If so, how?**

The response indicates the system's success in creating a "dynamic balance" between effort and recovery, the cornerstone of injury prevention. The coach became able to identify the "danger point" where training load exceeds the player's recovery capacity. When this imbalance is detected, the coach immediately intervenes by either reducing intensity or granting additional rest. This proactive mechanism prevents excessive and continuous pressure on muscles and joints, a primary cause of many sports injuries. The result was creating a safer training environment that maintained player continuity in training and matches, a crucial factor for athletic stability.

**Question 9: What were the biggest challenges or difficulties faced while implementing this technology?**

The analysis reveals that the challenges weren't purely technical but also human and organizational. Beyond the financial challenge of initial cost and maintenance, the "human capital" challenge emerged: the necessity to train coaches not only to operate the devices but to interpret data and integrate it into training decisions. The cultural challenge was also prominent, as the club faced resistance from some players to the idea of constant monitoring, which some interpreted as lack of trust. However, the experiment's ultimate success confirms these challenges are solvable when the technology proves its practical value and transforms from a monitoring tool into an aid for the player themselves.

**Question 10: How was data from the Polar device integrated with the coach's traditional observations and insights?**

The analysis shows a successful model of integration between "science and art" in training. Data didn't replace the coach's expert eye; both worked in harmony. Polar devices provided the accurate "quantitative picture": numbers and graphs telling the story of physical effort. Meanwhile, the coach's observations added the "qualitative picture": the player's mental state, focus level, tactical commitment, and determination. Combining the strict objectivity of data with the

considered subjectivity of human observation produced a comprehensive evaluation focusing not only on the body but also on the mind and spirit, offering a perspective neither method could provide alone.

**Question 11: Does the club intend to expand the use of these technologies or integrate them with other types of sports technology in the future?**

The response indicates a clear strategic vision for developing the technological system. The club doesn't view Polar as a final solution but as a cornerstone in building an "integrated system" for performance analysis. Plans to integrate with GPS systems for precise movement and distance tracking, and video analysis for understanding tactical aspects, reflect a deep understanding that human performance is multidimensional. Physical fitness (measured by Polar), spatial movement (measured by GPS), and tactical intelligence (revealed by video) are the three sides of the sports success triangle. This integration is the way to create an almost complete picture of the player and the team.

**Question 12: Based on this experience, what advice would you give to other clubs, especially in areas where resources might be limited?**

The wisdom gained from the club's experience is summarized in the principle of "starting with the necessary and gradual development." The advice isn't to wait for massive financial resources but to start immediately with the simplest tools that give the highest return, such as monitoring training load and recovery. The key isn't owning the technology itself but having the "human competence" capable of extracting value from it. Investing in training coaches to understand and use data is a greater investment than purchasing the devices themselves. Expansion should be natural, stemming from accumulated experience rather than fashion pressures.

**Analysis of Study Hypotheses**

**Main Hypothesis:** There is a statistically significant role of using Polar devices in improving the training and physical performance level of Joya Sports Club players.

The evidence extracted from the interviews strongly confirms this hypothesis, as the device's impact was not merely a marginal improvement but represented a radical shift in the club's training philosophy. One participant described it as a "turning point in the way Joya Club players are prepared.". Furthermore, the improvement was not limited to the physical aspect alone; it extended to the team's collective performance, as the system contributed to "enhancing collective performance" by providing a deeper understanding of each player's potential. Tangible evidence confirms this improvement, with observed "increased speed rates," "greater distances covered,"

and "enhanced ability to sustain high intensity for longer periods." These are all quantitative and qualitative indicators supporting the hypothesis of comprehensive improvement in training and physical level.

**Sub-hypothesis (a):** There is a positive statistically significant correlation between using Polar data in training planning and increasing the accuracy and efficiency of training programs.

The analysis results clearly support this hypothesis, as training planning transitioned from generality to precise customization. One coach clarified that the data contributed to transforming the training program from being "uniform for everyone" to a program "tailored precisely to the measurements of each player." This customization was not theoretical but manifested in the field through "adjusting exercise intensity according to each individual's capacity" and "balancing increase and decrease" in training load. Moreover, the ability to make instant decisions during the training session, such as "reducing exercise intensity or providing additional rest" when player readings exceed safe limits, shows how the data improved execution efficiency, not just planning. This strong link between data and training decisions created a fairer and more efficient training environment, where each player is treated according to their actual potential and not general impressions.

**Sub-hypothesis (b):** Relying on Polar devices significantly improves physical fitness indicators (endurance, strength, speed) among the club's players.

A noticeable improvement was observed in all monitored physical fitness indicators. In the area of endurance, the "recovery rate" indicator stood out as clear evidence of improvement, as it was noted that "heart rate drops faster after exertion," a recognized physiological indicator reflecting improved cardiorespiratory efficiency. Also, the "increased ability to sustain high intensity for longer" indicates better muscular endurance and ability to recover within the training session itself. As for speed, a direct "increase in speed rate" was recorded, which is also linked to improved explosive strength. Although strength was not explicitly mentioned, the ability to maintain higher speeds and remain in high-intensity zones necessarily requires improved muscular strength, indicating a comprehensive improvement in the basic physical components of the club's players.

**Sub-hypothesis (c):** Analyzing recovery and stress data through the devices reduces the injury rate among players.

The evidence for this hypothesis was decisive and direct, as one participant stated that monitoring the data "clearly helped reduce injuries." But more important than the acknowledgment itself is the existence of a clear working mechanism explaining this result, as the participant



explained that "when we notice that the training load is higher than the player's recovery capacity, we reduce the intensity or give them additional rest." This proactive mechanism in load management represents the core of injury prevention, as it prevents the accumulation of stress that inevitably leads to injuries. The tangible final result was achieved through "maintaining player continuity in matches with a lower injury rate," confirming that the system did not just provide early warnings but transformed into practical actions that contributed to creating a safer and more sustainable performance environment.

**Sub-hypothesis (d):** There are logistical (organizational) and financial challenges affecting the degree of effectiveness of implementing this technology in the club.

The analyses revealed the existence of real challenges faced by the club during the implementation phase, represented in three main groups. Financially, the "cost of devices and their maintenance" emerged as the first and biggest challenge, reflecting the financial burden these advanced technologies can represent. Organizational challenges included the need to "train coaches to use them correctly," requiring an additional investment in human capital before fully benefiting from the financial investment. A cultural challenge also emerged, represented in the "difficulty convincing some players of the need to adhere to the technology" initially, as the idea of constant monitoring faced resistance from some players who considered it an intrusion into their performance privacy. Although participants indicated that these challenges "decreased significantly" over time after players and coaches saw the practical benefits, their existence in the early stages undoubtedly affected the degree of application effectiveness and efficiency.

### Conclusions

The study demonstrated that the use of the Polar device at Joya Club significantly enhanced training quality by shifting from traditional observation to data-driven, individualized programs, improving players' endurance, speed, recovery rates, and reducing injury incidence. The device provided coaches with objective, real-time insights to adjust training intensity and rest, fostering a fairer and more efficient training environment and promoting a culture of scientific planning. Despite challenges such as financial cost, coach training requirements, and initial player resistance, the implementation proved feasible and effective, showing that even clubs with limited resources can successfully benefit from training technology.

### Recommendations

It is recommended to expand the integration of complementary technologies such as GPS tracking and video analysis, provide advanced training programs for technical and administrative



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staff, and increase awareness among players and parents regarding the benefits of these technologies. Clubs should allocate budget for technological investment and device maintenance, document experiences for knowledge sharing, regularly monitor the impact of technology on performance, and focus initially on cost-effective device functions with high return. Additionally, enhancing communication between fitness coaches and medical staff, seeking sponsorships or partnerships to reduce costs, standardizing data-driven evaluation criteria, integrating data into talent identification, and encouraging further academic research are advised to maximize the effectiveness and sustainability of technology-driven training programs.



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