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Blockchain Technology and Its Applications in Grassroots Sports Development in India

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ABSTRACT: Sports development in India has been a key concern for the nation for several years. Few key factors hinder the growth of the sporting scenario which need to be addressed. The purpose of this study is to explore the integration and innovation of blockchain technology for grassroots development and funding in the Indian sports industry. First, the technology's features and scope are described, as well as its applications in various industries. Second, an overview of the global sports industry is presented, with a focus on the income generation of players, teams, and associated organizations in order to comprehend the industry's value chain as a whole. The sports landscape in India is then examined in-depth, with observations made based on grassroots development through governance, schemes, and private entities. Finally, the system's major difficulties are identified, and ideas for incorporating blockchain technology to address those issues are presented. Therefore, a strategic solution to an evident problem has been conveyed through this research thus it poses a practical significance.

KEYWORDS: Blockchain technology, Sports industry, Grassroots development, Sports funding,Government schemes, Private entities, Smart contracts, India,.

I. INTRODUCTION

With a population of 1.32 billion people and only 35 Olympic medals, India clearly falls behind in the sports world. This is not due to a shortage of talented people in the country, but rather to inefficiencies in the system for nurturing them. Indian athletes confront several challenges in their journey, ranging from a lack of infrastructure development to the inability to afford medical bills and poor diet. All of this stems from a common problem, namely the lack of appropriate funding for athletes. Although provisions are there in the system, they are not effectively implemented or governed. The funding mechanism is designed in such a way that it may be misinterpreted or exploited, which has a negative impact on athletes. This problem might be remedied with effective technology applications that keep up with society's fast developments. Since the 1970s, the information technology industry has been steadily developing, with several advances in a variety of areas. With its exceptional qualities, the introduction of blockchain technology, also known as bitcoin's backbone, has opened doors to numerous sectors. Its implementation in the sports sector has the potential to bring about some revolutionary improvements and make grassroots funding in India a more reliable andefficientprocess benefitting Indian athletes.

II. BLOCKCHAIN TECHNOLOGY OVERVIEW

What is blockchain technology?

For the purpose of understanding this research, it is essential to shedding light on the concept of blockchain technology, its origin, functioning, features, and applications. The agenda of its overview being understanding relatively new technology and applying its core principles to discover new ideas to mitigate pressing issues in our society. Being the underlying technology of cryptocurrencies, blockchain technology is commonly misunderstood as one. Serving multiple functions besides just digital currency, blockchain has a deeper definition.

"Blockchains are open source collaborative software platforms employing distributed ledger technology that sprouted up in the nexus of cryptography, internet computing, and game theory."(Wieandt, 2021). The definition of blockchain technology is stated in numerous ways originating from a common concept. Put into a simple and digestible form, blockchain technology is a distributed and decentralized ledger system that records the simultaneous movement of digital assets in different locations. Unlike traditional databases, it is regarded as a database that saves

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information in blocks linked together and maintained by computers in a peer-to-peer network.

History of blockchain

Discussing the concept of cryptography, "New Directions in Cryptography" was published in 1976 followed by the paper that described the idea further- "Hot to Time-Stamp a Digital Document" by Stuart Haber and Scott Stornetta which laid out the concept to timestamp the data instead of the medium. David Chaum proposed a model introducing the concept of digital currency and electronic cash. A concept of controlling spam emails- "Hashcash" by Adam Back in 1997 further lead to the concept of creating money called "b-money" by Wei Dai based on peer-to-peer networks (Sarmah, 2018).

The primary technology behind Bitcoin: the buzzing currency, blockchain was used to ensure trustworthy peer-to-peer financial transactions removing third party involvement. The white paper by Satoshi Nakamoto described how cryptographic hashing in a network of blocks could be a solution to the double-spending problem using a peer-to-peer distributed timestamp server to generate computational proof of the chronological order of transactions generating trust in financial payments also making them irreversible (Nakamoto, 2008).

A few months later, an open-source software to implement the bitcoin system was released, and the first bitcoin network was launched in early 2009 when Satoshi Nakamoto produced the first bitcoins. Despite the fact that the creator of bitcoins remained unconfirmed, bitcoins continued to be generated and marketized, and a significant community was there to support and fix different faults with the code.

How does it work?

Blockchain being a distributed ledger comprises of similar information records known as blocks. The continually updating and growing database has a chain of such blocks linked by cryptographic hashing. This decentralized database comprises three core components namely:

1. The record
2. The block
3. The chain

The pillars supporting the functioning of blockchain are authentication, authorization, and proof of work.

When a user initiates a transaction on a Blockchain network, a block recording that transaction is produced at first. Once a block is generated, the desired transaction is broadcasted over the peer-to-peer network, which is comprised of computers known as nodes, which subsequently validate the transaction. A confirmed transaction may include cryptocurrencies, contracts, records, or any other important data. Once a transaction has been validated, it is merged with other blocks to form a new data block for the ledger. It is crucial to note here that with each new transaction, a secured block is generated, which is then secured and connected to the next using cryptographic principles (Srivastava, 2020).

Figure 1

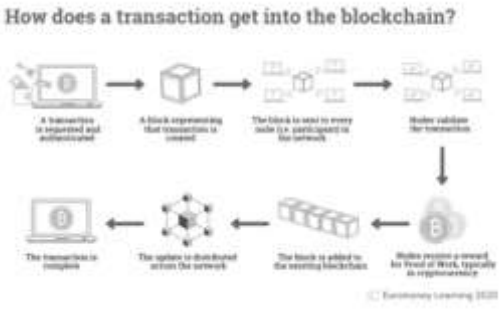

Image source: ukadmin (2021). How does a transaction get into the blockchain? https://uk.mcenterntw.com/2021/03/03/how-does-a-transaction-get-into-the-blockchain/

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Features of blockchain

The buzz around this technology is backed by its capability of disruption which is further supported by its distinct features. It offers the following features:

1. IMMUTABILITY

The immutability of blockchains is due to the fact that transaction data recorded in blockchains are tamperproof, which means it cannot be erased or updated. This feature supports its transparent nature while also maintaining its transactional integrity. This append-only data structure signals the permanent storage and availability of the stored information to all participants in the blockchain network (Politou et al., 2019).

2. DECENTRALIZED

Blockchain does not maintain any of its data in a central location. Rather, the blockchain is replicated and distributed over a network of computers. Every computer in the network updates its blockchain whenever a new block is added to the blockchain (Conway, 2020).

3. PEER TO PEER

A peer-to-peer network is provided by blockchain and because of this feature of blockchain, transactions can involve just two parties: the sender and the recipient. As a result, the necessity for "third-party authorization" is eliminated because everyone in the network is capable of authorizing transactions. This also results in cost reduction as the transaction fee is minimal and there is no extra commission involved due to the absence of third-party authorities.

4. SECURITY

Blockchain technology generates a data format with intrinsic security properties. It is built on cryptographic, decentralization, and consensus concepts that assure transaction confidence. Most blockchains or distributed ledger technology (DLT) organize data into blocks, with each block containing a transaction or set of transactions. Each new block in a cryptographic chain connects to all the blocks before it in such a way that it is virtually difficult to tamper with. A consensus process validates and agrees on all transactions within the blocks, guaranteeing that each transaction is accurate and correct. Network members each have their own private key, which is associated with the transactions they do and serves as a personal digital signature. If a record is changed, the signature becomes invalid, and the peer network is immediately notified that something has gone wrong (Miles, 2017).

5. CONSENSUS ALGORITHM

Since it is uncommon for all system nodes to be online at the same moment, a consensus is required in a distributed network. Furthermore, some information may be lost during transmission. The consensus algorithm solves the most difficult challenge that a distributed or multi-agent system faces. The algorithm's most basic application is to determine if a transaction in a distributed environment has to be implemented or not. It is used by the majority of blockchain networks. It guarantees that consensus is reached with the least amount of resources while maintaining integrity and openness in the judgments it makes. Two popular types of consensus algorithms for blockchain technology are proof of work and proof of stake (101 Blockchains, 2018).

6. EFFICIENT SETTLEMENT

Removing the third-party involvement in the transaction process, blockchain technology can enable transparency amongst all parties in minimal time by its ability to convert the financial account paradigm to the token paradigm. Much of the middle-office work required to effectively validate transactions and identities between parties is eliminated as a result. The real-time settlement eliminates the need to spread reserves over several exchanges, allowing for better capital utilization and lower transaction fees (Xu, 2020).

Types of blockchain

In accordance with their multiple attributes, blockchains are of various types as well. Some of the widely known and important types include:

1. PUBLIC BLOCKCHAINS

Public blockchains are accessible to the general public and may be used by anybody. Individuals can participate in decision-making by becoming a node, although users may or may not profit from their participation in the decision-making process. The ledgers are owned by the network and are publicly accessible.

2. PRIVATE BLOCKCHAINS

These blockchains are not available to the general public, but rather to a select set of individuals or organizations, and the ledger is only shared with those who have participated in the network.

3. PERMISSIONED LEDGER

The participants in this form of blockchain are already recognized and trustworthy. An agreement protocol, rather than a consensus method, is employed in a permissioned ledger to establish a common version of the truth.

Other types of blockchains include semi-private, sidechain, distributed ledger, shared ledger, proprietary blockchains, tokenized, and tokenless blockchains (Sarmah, 2018).

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Innovation in blockchain

1. CURRENCY

A cryptocurrency, like the US dollar, is a means of exchange that is digital and employs encryption techniques to control the production of monetary units and to authenticate the movement of funds (PricewaterhouseCoopers, 2013).

Bitcoin: Bitcoin is a type of cryptocurrency. There is no physical bitcoin; rather balances are recorded on a public ledger that everyone can see. A tremendous amount of processing power is used to verify every bitcoin transaction. Bitcoin is neither issued nor guaranteed by any banks or governments, nor is it worth anything as a commodity. Bitcoin promises reduced transaction costs than standard online payment methods and, unlike government-issued currencies, is run by a decentralized authority.

Bitcoin was one of the first digital currencies to make use of peer-to-peer technology to enable rapid payments.

Bitcoin "miners" are the independent individuals and companies who own the governing computing power and participate in the bitcoin network. They are in charge of processing transactions on the blockchain and are motivated by rewards (the release of new bitcoin) and transaction fees paid in bitcoin. These miners may be regarded as the decentralized authority ensuring the bitcoin network's legitimacy. Bitcoin and other cryptocurrencies work differently from fiat money; under centralized banking systems, the currency is released at a pace that corresponds to the increase of products; this method is meant to ensure price stability (Frankenfield, 2021).

There are hundreds of currencies like Litecoin, ether, etc. in addition to bitcoin but bitcoin is the largest in popularity and market size.

2. ETHEREUM

Ethereum is a blockchain platform that has its own money, Ether (ETH), and its own programming language, Solidity.

Ethereum, as a blockchain network, is a decentralized public ledger used for transaction verification and recording. Users of the network may build, publish, monetize, and utilize apps on the platform, as well as use the Ether cryptocurrency as payment. Ethereum was designed to let developers construct and publish smart contracts and distributed apps that may be utilized without fear of downtime, fraud, or third-party intervention. It differs from Bitcoin in that it is a programmable network that acts as a marketplace for financial services, games, and applications, all of which can be paid for using Ether cryptocurrency and are free of fraud, theft, or censorship (Frankenfield, 2021b). 3. SMART CONTRACTS

Smart contracts are simple programs that run when certain criteria are satisfied and are recorded on a blockchain. They are generally used to automate the implementation of an agreement so that all participants are instantly confident of the outcome, without the participation of an intermediary or the waste of time. They can also automate a workflow by initiating the next activity when certain circumstances are satisfied. They provide numerous benefits and are one of the greatest innovations in blockchain technology. Their benefits include:

a. Efficiency and accuracy: Since smart contracts are digital and automated, there is no paperwork to handle and no time wasted correcting errors that frequently occur when manually filling out forms.

b. Transparency: There is no need to question if the information has been changed for personal gain because there is no third party engaged and encrypted records of transactions are transmitted among participants.

c. Secure: Blockchain transaction records are encrypted, making them extremely difficult to hack. Furthermore, because each record on a distributed ledger is linked to the preceding and subsequent entries, hackers would have to modify the entire chain to change a single record.

d. Trust and savings: Smart contracts eliminate the need for middlemen to conduct transactions, as well as the time delays and fees that come with them (IBM, 2021).

Applications of blockchain technology

Considering the disruptive nature of this technology, it is essential to analyse its present and future impact on various industries so as to get a sense of how its features can be applied to generate value making them sustainable and efficient. Some of the industries impacted by blockchain are mentioned in Table 1 (Appendix).

III. SPORTS INDUSTRY OVERVIEW

Before we dive into the intricate applications of blockchain technology in the sports industry we must understand and address a list of questions in order to make calculated decisions about which issue can be solved by applying the features of blockchain. The four broad questions are as follows:

- What is the size of the sports industry globally?

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● What is the current scenario of the Indian sports industry?
● How does the monetary and funding mechanism work across different sports and levels of athletes?
● Can blockchain contribute to making it more efficient?

GLOBAL SPORTS INDUSTRY

1. Size and classification

The global sports market is expected to grow from $388.28 billion in 2020 to $440.77 billion in 2021 at a compound annual growth rate (CAGR) of 13.5%. This increase has mostly been attributed to firms reorganizing and recuperating from the impact of COVID-19, which previously resulted in tight containment measures involving social distance, remote working, and the termination of business activities that resulted in operational problems. The market is expected to reach $599.9 billion in 2025 at a CAGR of 8% (ltd, 2021). The industries are classified on the basis of region, type of engagement, and revenue generation.

By region: America, at 30,5 percent of the world market, was the biggest market in the sports industry. Western Europe, Asia-Pacific, and the other areas followed. The quickest increasing geographies on the market are Asia-Pacific and the Middle East, with a compounded annual growth rates of 9.04% and 6.2% respectively. Following them are North America and South America, with CAGRs forecast to rise correspondingly at 6.0 and 5.30 percent.

By engagement: The sports market is divided into two categories based on the type of engagement: participatory sports and spectator sports. In 2018, the participation sports market accounted for 56.4 percent of the sports market. The spectator sports market is anticipated to develop at the quickest rate in the future, with a CAGR of 5.9 percent. The spectator sports market is divided into two categories: sports teams and clubs, as well as racing and individual sports. In 2018, the sports teams and clubs market accounted for 72.5 percent of the spectator sports market. It is anticipated to expand the quickest in the future, with a CAGR of 6.8 percent. In 2018, the fitness and leisure sports centres market accounted for 39.8 percent of the participation sports market. The market for others - participatory sports is estimated to rise the quickest in the next few years, with a CAGR of 8.4 percent.

By revenue: The sports industry is also divided into four revenue streams: gate revenue, broadcast rights, sponsorship, and merchandise. The sports merchandising industry is anticipated to be the fastest-growing category in the future, with a CAGR of 7%. In 2018, the sports market by media rights was the largest component of the sports market, accounting for 23.7 percent of the total (Wire, 2019).

In the next section, we will discuss revenue generation and the value chain in the sports industry followed by its presence with respect to the Indian market.

2. Revenue generation: The sports industry is a full-fledged business with profitable past and steady growth as well as a potential to exponentially increase their revenue from the mentioned revenue streams. While a major portion of revenue generation is at the professional level, we will be discussing revenue streams at the grassroots as well for the purpose of this research.

Professional teams/organizations/leagues earn their income from mainly the following revenue streams:

a. **Broadcasting Rights**- The link between sport, television, and other media are supported by copyright and associated rights, notably those connected to broadcasting companies. Television and media companies pay exorbitant fees for the exclusive privilege to broadcast live top sporting events. The sale of broadcasting and media rights is currently the most important source of revenue for most sports organizations, producing the cash required to finance major athletic events, rebuild stadiums, and contribute to the growth of the sport at the grassroots level. Royalties earned by broadcasters from selling exclusive content to other media sources allow them to invest in costly organizational infrastructure. The cost-effective equation of sport and television coexists. Leagues in major sports are able to send millions of dollars a season to broadcast their games. The networks also sell advertising to national, regional, and local advertisers for half a minute. The sponsors, relying on their items to reach the appropriate buyers, pay hundreds of thousands of dollars for exposure blasts (U.S. Sports Academy, 2008).

b. **Ticket Sales, Concessions & Merchandise** - Fan-centric revenue items like ticket sales,concessions, and merchandise are typically overshadowed by massive broadcastingagreements however they contribute extensively to the revenue of the events.Merchandise is a tiny but high-potential revenue area for the sporting events business,accounting for roughly 3% of total revenue in 2013. Merchandise sales are directlyrelated to fans' degree of engagement with sports, athletes, and teams. Ticket salesrevenues for a sports event often referred to as the gate fee represented a 27% proportionof the worldwide market for sports events in 2013. Over the years

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this fraction hasgradually decreased due to lower stadium profits and increased sponsorship expendituresand media rights (Gillett, 2017).

c. Sponsorship: Besides large media contracts and more tangible items like tickets andconcessions, professional sports leagues and teams also make a large sum of money byselling companies the rights to sell items that represent their league or team. Sporting events currently account for a significant amount of money spent on sponsorships worldwide. Around 35 percent of the global sporting events industry was accounted for in 2013 through sponsorship fees. Five primary sports sponsorship sectors exist — on-the-ground, teams, franchise fees, on-air, and athletes. Brands are progressively using new ways of attracting fans of sports across various groups (Gillett, 2017).

At the grassroots level, sports bodies usually generate income from user fees, food and drink sales, clothing and equipment sales, fundraising, and government funding of facility creation projects. Grassroots sports organizations often earn money that is linked to the 'throughput' of participants. The organization benefits from relatively high returns and better sport quality when its number of participants rises. However, local demographic changes to the grassroots organizations which threaten their sustainability might occur over time. In the general sense, grass-roots organizations do generate not enough income to meet any cost for the essential performance quality regardless of expansion or decline. The management committees of sports organizations hesitate to increase the fees and costs of the organization's members.

INDIAN SPORTS INDUSTRY

As of 2020, the size of the Indian sports industry was estimated to be around $796 million. Media accounts for 62% of the total expenditure on television, digital, and print media. Sponsorship Spends included on-Ground sponsorships, team sponsorships, and franchise fees,and this took up 28% of the industry pie. Athletic endorsements gained momentum with a 5%increase in 2020 compared to 2019. During the pandemic, while sports were at a halt, there was asignificant increase in brand endorsements by players through social media. The absence of livesports during this time led to an increase in the section of gaming and esports (Bureau, 2021).To better understand the sporting ecosystem in India we have to look at India's sports industry'sgoverning bodies and federations- their functioning and challenges, the value chain anddevelopment scenario of the market and analyse the situation from an athlete's perspective.

1. Value chain and development

Apart from the revenue generation in the sports industry globally, there have been quite a fewsports-related developments in India as well.

Sports startup culture: Over the last several years, India has seen the arrival of a slew ofsports-related start-ups, including those active in sports infrastructure, data/content aggregation,education and training, online retail, technology, and online ticketing. A few examples being the bridge, Sports365, Fitternity etcetera. These startups are growing tremendously considering thatthe industry is still in its infancy.

Leagues: The launch and rise of various sports leagues have led to increased viewership,sponsorship, and participation. The Indian Super League (ISL) and the Pro Kabaddi League have been huge hits with a cumulative viewership of 435 million as of 2014 and its growth rate is 26%and 20% respectively. Sponsorships (on-ground) were tripled in kabaddi and almost doubled infootball and revenue alone from it being Rs.45 crores and Rs.100 crores respectively. Followingthem were the Pro Badminton League and the Hockey India League along with 4 other leagues.Urbanizing the predominantly rural sport-Kabaddi led to increased rural viewership. Moreover,the soccer league ISL gained 47% of its viewers from rural areas depicting the level of sportsenthusiasm in the rural sections of our nation (Gillett, 2017).

Grassroot development through leagues: The great majority of the teams work to create adevoted fan following, which may help the brand monetize successfully. A big fan baseguarantees better sales of tickets and goods and more negotiating power throughout thesponsorship process. It also contributes to reducing reliance on central pool earnings. In addition,sports and teams remain alive and therefore form a key component in their success. Therefore they carry out initiatives in order to maintain a loyal fan base from all sections of society. Some examples of initiatives taken by leagues for grassroots development of sports are in Table 2(Appendix).

2. Government and affiliated organizations

` The sports system in India is essentially federated, governed by government organizationsvarying in size and functions. Moreover, each sport is also governed by bodies

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according to theirgeographic area. The two largest governing bodies in India for sports are the Ministry of YouthAffairs and Sports under the central government and the Indian Olympic Association affiliatedwith the International Olympic Committee. In addition to this, there are two major organizationsgoverning sports in India namely- Sports Authority of India and the National Sports Federations.State and district organizations are mainly responsible for activities at the ground level and much smaller in comparison. Now we must assess the roles and responsibilities of these bodies and theimplementation challenges with a key emphasis on the funding scenario in order to narrow theperspective of this research to short and easily addressable points.

a. Ministry of Youth Affairs and Sports

The Ministry of Youth Affairs and Sports is the primary government ministry of India totake care of the growth of the country's sports and games. The Ministry operates variousschemes to achieve broad-basing of sports and excellence in sports. The broad roles andresponsibilities of the ministry's department of sports are:
(i) Infrastructural development for better stadiums/training facilities in order to contributetowards athletes' quality of play and prepare them for international participation.(ii) Implementation of policies for the federation for improved sports governance.(iii) Development of sports schemes in areas of athletic welfare, talent scouting, and funddisbursement, and promotion of sporting culture (Ministry of Youth Affairs and Sports,2020).

b. Indian Olympic Association

The Indian Olympic Association is one of the main governing organizations of Indiansports. They are in charge of the participation of Indian athletes in the Olympic Games,Commonwealth Games, Asian Games (Outdoor-Indoor), and South Asian Games. TheIndian Olympic Association is charged with organizing sports people's participation in the Olympic Games. Aside from selection, the IOA decides on the organizing of severalnational games. One of the IOA's primary responsibilities is to safeguard and preserve thestatus of amateur athletes in India. It is also in charge of promoting and developingIndia's Olympic Movement. The major functions of this association are:
(i) Taking the decision on the organizing of National Games
(ii) Maintaining cooperation between the Indian government and member federations orgroups.
(iii) Protecting sportspersons' amateur status as well as advancing and expanding theOlympic Movement.
(iv) Collaborates with the Government of India for financial assistance, governs NSFs,and promotes Olympic sports in India (Indian Olympic Association, 2018).

c. Sports Authority of India

The field arm of the Ministry of Youth Affairs- Sports Authority of India has been promoting, supporting, and nurturing sportspersons in India since its establishment in1984. It acts as an interface between the Ministry of Youth Affairs & Sports and other agencies concerned with the promotion/ development of sports in the country. It has a twin objective of achieving sporting excellence at the international level as well as broad-basing sports in India. Along with these, it has numerous aims and objectives listed as follows:
(i) Establish, run, manage and manage high-quality coaches, sports researchers, and instructors in physical education.
(ii) Planning, constructing, acquiring, developing, managing, maintaining, and using the country's sports infrastructure and facilities.
(iii) Initiating, sponsoring, stimulating, and encouraging the development of research initiatives in sports sciences, sportspeople, and coaches.
(iv) Implementing plans / programs in many disciplines to achieve excellence in sport internationally to make India an important sports power (India, 2021).

d. National Sports Federations

The National Sports Federations (NSF) are the national governing body for sports inIndia. National Sports Federations are completely liable for the whole administration,direction, control, regulation, promotion, development, and sponsorship of the disciplinefor which they have been authorized by the relevant International Federation. Its primaryfunctions are to create financial viability for the sport, financial sustenance to athletes,athletic engagement, promotion of sporting culture, and building a talent pipeline. It alsohas some specific objectives.
(i) Identifying, selecting, and preparing athletes for international tours/competitions so asto ensure world-class training is being provided to them.
(ii) Organizing and implementing national championships as well as maintaining rankingrecords of players.
(iii) Ensuring that the technical integrity of the sport is kept up to the mark by providinginternationally accredited coaches,

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referees, and technical officials and raising funds tosupport the costs (Pande, 2018).

3. Schemes and initiatives

The organizations discussed above have been implementing various sports-relatedschemes/initiatives in order to meet their objectives. The schemes mentioned below are some ofthe most widespread and functional schemes in the nation. The schemes are assessed and wedelve into the schemes particularly related to the research topic and calibrate their impact,outcomes, and challenges.

a. National Sports Development Fund

In 1998 under the Charitable Endowments Act 1890 (NSDF) the National SportsDevelopment Fund was formed; it was notified in November 1998 to the Government ofIndia. The objective of the Fund is to give drive and flexibility to the cause of sport. Itenables the athletes to develop by providing them with technical, scientific, and psychological assistance and exposure to international events under coaches with aworldwide reputation. The Fund also offers financial help for infrastructure developmentand other supporting activities; the Fund's role is in addition to the Department of Sport'soverall policies and operations (MYAS, 2019).

b. Target Olympic Podium Scheme

The Target Olympic Podium Scheme is a flagship initiative of the Ministry of YouthAffairs and Sports that aims to help India's best athletes. The Scheme aims to boost theseathletes' preparations so that they can win Olympic medals in the 2020 and 2024Olympics. The Scheme requires the Department of Sports to select athletes who have the potential to win medals at the 2020 / 2024 Olympics. The Scheme's goal is to look aheadand finance a Developmental Group of Athletes who are medal contenders for theOlympic Games in Paris in 2024 and Los Angeles in 2028.

The Scheme allows chosen athletes to seek help for the following reasons: –(i) Tailored instruction with reputable trainers at institutes with world-class facilities.(ii) International competition participation.
(iii) Equipment purchase. (iv) Support staff/personnel services such as Physical Trainer, Sports Psychologist, MentalTrainer, and Physiotherapist, among others. (v) Any other assistance related to the athletic discipline. (vi) As an incentive, the athletes would get an out-of-pocket allowance of Rs. 50,000/-(Rupees fifty thousand only) every month (SAI, 2020).

c. Sports Authority of India Promotional Schemes

There are seven promotional schemes introduced by the Sports Authority of India toincorporate sports culture in India. The schemes along with their objectives are in Table 3(Appendix).

d. Khelo India

Overview: The Rajiv Gandhi Khel Abhiyan (RGKA), Urban Sports InfrastructureScheme (USIS), and National Sports Talent Search Scheme (NSTSS) were integrated intoa single scheme i.e. "Khelo India: The Sports Development Programme;" in 2015 inorder to promote mass participation in sports and achieve effective implementation.Its objectives are to promote mass sports participation of youth via structured sportscompetitions and talent identification, scouting, nurturing through existing sportsacademies and new set up either by the Central Government or State Government or inPPP mode. It also involves the creation of sports infrastructure.

Key components: the three major components of this scheme to be considered are talent,competition, and infrastructure. The operations, budget, and impact under eachcomponent are as follows:

(i) Competition: the competition structure covers the whole of India and is carried outvia district, state, and national competitions. It is fully funded by the central governmentand central sector schemes but assistance in the form of land availability, labor, andinfrastructure is met by the state government/associations. However, the organizers of thecompetitions are allowed to bring private sponsorships/donations in cash/kind which isthen further accounted for in the fund. For the year 2016-17, the funds allotted to thiscomponent were Rs. 230 crores excluding any sponsorship/donation.

(ii) Talent identification and scholarships: the talented and top-performingsportspersons under the two categories of competitions i.e. U-14 and U-17 are awardedscholarships for the next 12 months and are provided with coaches from the SportsAuthority of India for extensive training. The selected players are only eligible for onescholarship per year and have to go through the selection process again the next year. Thegrant structure is displayed in the table below with respect to the Gujarat
Khelmahakumbh Model under the state government of Gujarat.

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Figure 2

S.No.	Level of competitions	Maximum number of talented players to be identified (indicative)	Amount of Scholarship (in Rs.) per month/per head
(i)	District	9765	500/-
(ii)	State/UT	1980	1000/-
(iii)	National	400	2000/-

Imagesource:https://yas.nic.in/sites/default/files/Revised%20Khelo%20India%20-%20National%20Programme%20for%20Development%20of%20Sports%20Scheme_0.pdf

(iii) Infrastructure: assistance in the form of infrastructural development under thisscheme can only be accessed by state governments/councils/authorities, schools/colleges under state/central government, local civic bodies, and sports control boards. It caters tothe creation and development of stadiums, complexes, and training facilities. The schemeis integrated with the Member of Parliament Local Development Scheme in which aMember of Parliament contributes at least 50% of the admissible grant for an individual project and a minimum of Rs 1 crore and a grant matching it will be contributed by theMinistry of Youth Affairs and Sports. For projects under the scheme, any expense abovethe maximum admissible grant is to be borne by the grantee. The snapshot of the grant isgiven below with respect to the Gujarat Khelmahakumbh Model under the stategovernment of Gujarat.

Figure 3

S. No.	Particulars	Maximum Admissible Grant upto
1.	Synthetic Athletic Track	Rs. 7.00 crore
2.	Synthetic Hockey field	Rs. 5.50 crore
3.	Synthetic turf football ground	Rs. 5.00 crore
4.	Multipurpose Hall of size 60M x 40M x 12.5M	Rs. 8.00 crore
5.	Swimming Pool	Rs.5.00 crore
6.	Construction of Stadia complex at District Hqs.	Rs.50.00 crore

Image source: https://yas.nic.in/sites/default/files/Revised%20Khelo%20India%20-%20National%20Programme%20for%20Development%20of%20Sports%20Scheme_0.pdf
According to the above-estimated expenditure for the Gujarat Khelmahakumbh Model,the total annual expenditure was calculated for the year 2016-17. The figure representsthe data.

Figure 4

1. **Annual Sports Competitions**
Sports Competitions (including scholarships) : **Rs. 230 crore**

2. **Talent Search and Grooming and support to academies** : **Rs. 100 crore**

3. **Sports Infrastructure Scheme**
Infrastructure for urban areas : Rs.60 crore
Infrastructure for mofussil/ sub-district areas : Rs.76 crore
Total : **Rs. 136 crore**

4. **Sports and Games for the disabled** : **Rs. 4 crore**

5. **Dissemination& awareness, Office expenses, remuneration of staff, development of web portal, training, administrative and misc. expenses etc.** : **Rs. 30 crore**
Total :**Rs.500 crore**
Fund Flow :

(Rs. in crore)

Details	2016-17
Non – recurring	136
Recurring	364
Total	500

Image source: https://yas.nic.in/sites/default/files/Revised%20Khelo%20India%20-%20National%20Programme%20for%20Development%20of%20Sports%20Scheme_0.pdf

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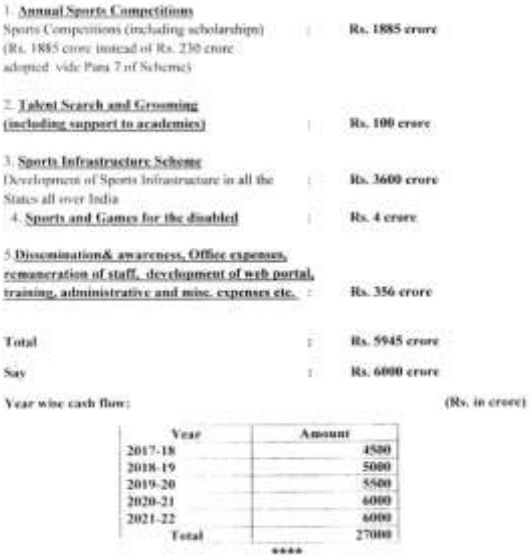
Taking the above fund requirements as an example for other states in India. Thefollowing budget was projected from the year 2016-17 to 2021-22 (Government of India,2016).

Figure 5



1. Annual Sports Competitions
Sports Competitions (including scholarships) : Rs. 1885 crore
(Rs. 1885 crore instead of Rs. 230 crore adopted vide Para 7 of Scheme)

2. Talent Search and Grooming (including support to academies) : Rs. 100 crore

3. Sports Infrastructure Scheme
Development of Sports Infrastructure in all the States all over India : Rs. 3600 crore

4. Sports and Games for the disabled : Rs. 4 crore

5 Dissemination& awareness, Office expenses, remuneration of staff, development of web portal, training, administrative and misc. expenses etc. : Rs. 356 crore

Total : Rs. 5945 crore

Say : Rs. 6000 crore

Year wise cash flow: (Rs. in crore)

Year	Amount
2017-18	4500
2018-19	5000
2019-20	5500
2020-21	6000
2021-22	6000
Total	27000

****

Image source: https://yas.nic.in/sites/default/files/Revised%20Khelo%20India%20-%20National%20Programme%20for%20Development%20of%20Sports%20Scheme_0.pdf

4. Private organizations and their support

In India, creative and substantial contributions to the sports industry are made by private andnot-for-profit organizations that are not typically found in other nations. Overall, most professional sports leagues are not-for-profit organizations that manage the contest on behalf of private participant teams. However, private partnerships and ownership were formed at theleague level in India, by firms such as Reliance, Star Sports, and the Mahindra group asmentioned above in the section of grassroots developments via leagues. In India's elite sportssystem other organizations worth mentioning are non-profit athlete support bases. These organizations—two of which are the GoSports Foundation and Olympic Gold Quest—drawmostly on financing for elite-support services provided to athletes by corporate socialresponsibility programs that are unable to be received by more formalized sports systems(Schoenberg, 2019).

IV. KEY CHALLENGES

The growth and development of the Indian sports industry have been and will be beneficial forthe nation in terms of social inclusion, healthier youth, and happier communities. However, thereare some undeniable challenges that persist in the area. The major challenges faced by the Indiansports industry are discussed in this section in order to provide a clear understanding of thesporting scenario in India with respect to funding and related developments. The problems that persist are identified and potential solutions that could be achieved by blockchain application aresuggested.

1. ADMINISTRATIVE ISSUES

a. Underutilisation of resources

During the years 2018-19 and 2019-20 the Khelo India estimated annual budget wereINR 500 crores and INR 520 crores respectively. However, the actual expenditure on thescheme was amounted to be INR 318 crores and INR 324 crores. The Department ofSports specified several constraints in the implementation of the scheme such asinadequate funds, human resources, and sports infrastructure (Human Resource Development, 2019). It noted the need for an increased budget to remedy theseconstraints. It is clearly visible that the expenditure is well below the funds provided butthe fact that the department requires more funds for additional implementation gives riseto questionable governance.

b. Lack of accountability and transparency

Needless to say, there is obviously a lack of accountability and transparency in theexisting model of Indian sports governance, creating an

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environment susceptible towidespread corruption, jeopardizing overall legitimacy for the scheme. Irregularity ofrevenue management is also amass. Lack of credibility of an organization can lead totrust issues which can further impact its relations and can lead to reduced funding as wellas increased scrutiny. This, therefore, makes it harder for the governing bodies to fulfiltheir goals which in turn has an adverse effect on the athletic career of the nation's youth.c. Management within the organization

There are issues within the governing bodies that give rise to these accountabilityconflicts. A major reason is that there are politicians without a sporting backgroundheading the bodies instead of former players in the field. Their ties with the policymakersallow the malpractices to creep into the system giving them monetary benefits at the stakeof athletic welfare in the country. Another practice linked to this is that internal electionsin the institutions are held irregularly and are extremely opaque in nature. So even if

former athletes participate they wouldn't be elected in most cases considering thetransparency issues.

The administrative conflicts that the organizations face have some common underlying issuesthat once solved, would improve the governance structure and would further enable athletes toget the adequate funding they want. There are difficulties pertaining to the transparency of fundutilization and internal elections.

2. INEFFICIENT REACH OF SCHEMES

a. Uneven distribution of funds

The Khelo India scheme's fund disbursement mechanism poses uneven distributionamongst different states where states like Bihar, Chhattisgarh, Jharkhand, etc have notreceived adequate funds. The Khelo India Scheme specifically says that special emphasiswould be devoted to the development of talent from tribal, coastal, and rural areas. Thissignificance has not been translated, since Parliamentary data from March shows that,except Manipur, athletes from the other North-eastern states and Union Territories have been pretty much ignored (Subramaniam, 2020). The funds provided to the states by thecentre have not been put to proper use and in some cases not even any use at all. Statisticfrom 2017-18 shows that the utilization certificates were pending from ArunachalPradesh where INR 13 crores weren't used out of the INR 15 crores allotted.States of Telangana & Gujarat had UC's pending for 100% of the released funds of Rs. 6.5 crores and 5.5 crores respectively. Besides, the states of Rajasthan and Karnataka had also not utilized Rs. 7.5 crores and Rs. 6.75 crores respectively (Kashyap, 2019).

b. Lower reach of schemes

Apart from the above reason, there have been much more factors contributing to thelesser reach of the schemes with one of the largest contributors to this concern being theextremely lengthy talent selection process and inefficient scholarship provisions. Theschemes like the Target Olympic Podium scheme just target the top talents and otherschemes that are associated with grassroots development have numerous rounds ofselection and the spots are far less than the athletes that require aid. Moreover, theathletes are granted aid regardless of their financial background which might hurt the players who actually need it. Investing in their early growth is a noble goal, but themanner in which the Khelo India scholarship is distributed appears to be counterproductive. A single year of subpar performance might result in an athlete being"weeded out" of the scholarship; a single injury or short pause in performance couldresult in young, potential athletes losing an opportunity to continue progressing towardtheir objectives. These young athletes are under a lot of strain and uncertainty as a resultof this. Additionally, a standard Rs. 10000 scholarships given to selected athletes under

Khelo India per month might be sufficient for a runner but not for a shooter since theirexpenses differ on the basis of the equipment.

c. Duplication of services

An efficiently regulated system guarantees that various parties work together to make the best use of resources by minimizing duplicate programs and services and ensuring thatthere are no gaps in serving the demands of the sport. In India, several levels ofgovernment, sports organizations, and the commercial sector frequently providecomparable services such as coaching, academies, and tournaments, but certain criticalareas are ignored. Duplication of services is troublesome because it creates uncertaintyabout accountability among organizations and athletes, is wasteful, and can leave holes inthe sports development system.

Despite the efforts of the planning of schemes, many areas are overlooked in theirimplementation. The above three points highlight that there exists an uneven distribution offunds which leads to a lower reach of the scheme's objective. Moreover, athletes face hardshipsin receiving scholarships according to their needs and struggle to retain in the program. Lastly,duplication of services unnecessarily creates

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confusion amongst organizations while providingvalue to athletes.

3. PRIVATE ORGANIZATIONS

a. Public-private partnership (PPP) issues

Successful PPPs are a critical facilitator of sports growth. PPPs may be used to constructinfrastructure by allowing professional private sector companies to manage andadminister existing state/central government sports infrastructure with the goal ofdeveloping commercial models and transforming them into revenue centres. Increasedasset use and income production might incentivize the development of sportsinfrastructure. PPP for sports development is restricted in India due to a lack of definedstandards and incentives for states to implement PPP into their sports programs, resultingin financial restrictions.

b. Lack of league culture

Despite upcoming leagues in different sports many of them do not sustain due to lack oftransparency in sponsorship contracts, fewer media rights, and viewership resulting indecreased revenue generation. This issue translates into the clubs not carrying out manysocial activities which deteriorates their fan base and harms the lives of aspiring athletessince they are not able to get the help which they would have earlier gotten through thoseacts. This also contributes to the decreasing sports culture in India.

The challenges related to private organizations give out information regarding the problems ofstate politics in infrastructural development as well as less revenue generation of clubs whichleads to fewer private athletic scouting and funding.

V. OPPRTUNITIES FOR DEVELOPMENT

The key concerns hampering the grassroots development and funding highlighted above could beresolved by implementing blockchain technology by applying its unique features into theindustry.

a. Improving transparency and accountability and fund disbursement.

Blockchain is a record-keeping system in which cryptography is used to link data in alinked structure. The blockchain promises to restore confidence where it has been lostthrough its verification methods. Its distributed nature, in which a ledger is replicatedacross several nodes, precludes undetected efforts to alter records. A blockchain-based process can directly address corruption-risk factors by facilitating third-party oversight oftamper-evident transactions and enabling greater objectivity and uniformity throughautomated smart contracts, thus enhancing the transparency and accountability oftransactions and actors (world economic forum, 2020).A public blockchain, permanently,openly, and most crucially, securely records all information and transactions on thedecentralized database. Blockchain can hold state and local actors accountable for anymisappropriation of allocated funds by allowing the government to trace the transfer ofcash (Ahluwalia, 2017).

b. Internal elections

The problem of management within the organization needs attention as the deservingex-sports persons who can efficiently control the organization is not being elected due tovoting frauds. This can be cured through e-voting. Blockchain's transparent, encrypted,and decentralized system might offer an alternative by allowing an online voting systemwith little fraud or manipulation. Since blockchain transactions are impossible to erase ormodify, and because there is no central system, it would be a safe means to conductvoting. Besides the actual procedure, vote counting is a time-consuming activity wherethe greatest manipulation occurs. This problem may potentially be solved via blockchain,which would offer real-time data and assure error-free results (Analyst et al., 2021).c. Efficient talent scouting and athletic funding

Database for athletic scouting: The promise for blockchain adoption in talentacquisition appears to be centered on the technology's ability to not only assure datasecurity and personal privacy but also to ensure that athlete and applicant information is both safeguarded and immutable. A few apparent blockchains uses in talent recruiting.These are some examples:

- Statistics, track record, and profile: The use of inflated or false resumes and employmentapplications may be readily curtailed using blockchain by creating a separate, securerecord that is decentralized from the main recruiting system of record and requiresinformation to be digitally recorded and validated.
- Background Checks: The blockchain may also be used to verify other background check basics such as family income and assistance eligibility. A distributed ledger that can beeasily shared but never altered appears to be a perfect solution for verifying information

such as education, earning history, and identification. This will be especially beneficial inthe development of grassroots talent (Payseno, 2021).

Athlete crowdfunding: Crowdfunding and peer-to-peer fundraising have seensignificant growth in industries with the reason behind it being that they provide thefacility to raise funds easily where the associations fail to reach. However, it facestransparency issues. Blockchain technology is one technology that can be used to build aframework that gives transparency and can keep track of funds raised for athletes andwhat they are utilized for. Blockchain can aid in the development of an authenticitysolution that eliminates the lack of transparency. An effective solution for properlytracking athlete funding and how the funding is used can be created using blockchain-based digital IDs. Blockchain technology assures that the crowdfunding process is transparent, from money raising to distribution. When money is raised, theentire amount raised as well as the sources are securely recorded on the blockchain.Similarly, when money is dispersed, each transaction is recorded on the blockchain.Crowd funders may keep track of how the money is disbursed - in this example, toathletes - in this manner (Forbes, 2019).

With the extreme competitiveness of amateur sports and rising costs, it is hard for athletesto maintain earnings and to get ahead in the game. Tokenization (initial coin offering) ofamateur and low-level professional athletes seeking money to begin their careers is auseful proposal for individuals pursuing a professional sporting career. Platforms thatallow investors to examine an athlete's video and credentials and then contribute instantcash in exchange for a future share of the athlete's profits must adopt blockchaintechnology in order to hold parties to their commitments via smart contracts (Mire, 2018).Smart contracts would ensure world-class training to aspiring athletes in return for part oftheir future revenues.

d. Duplication of services

Another recommendation to mitigate the issue of duplication of services is to ensure thatonce a fund is disbursed/granted for a specific purpose it should be accounted for/storedin such a manner that it should be visible to all so that other organizations need not provide the similar service. Instead, the amount of funds granted for that particular purpose must be increased so that there is not any confusion that results in unnecessaryduplication of efforts. This can be perfectly resolved by blockchain technology.Considering its decentralized nature, the fund allotment and expenditure by organizationswould be available and other organizations can work on their specialized services and thecenter can grant funds to organizations efficiently based on this methodology.e. Revenue generation for clubs

Media rights: TV networks pay the big leagues billions of dollars for exclusive access to broadcasting rights. Blockchain technology may be used to create pay-per-view broadcasts, which are popular in sports. Blockchain cryptography can help authenticate
consumers online without going through cable companies that operate as intermediaries(Sharma, 2019).

VI. CONCLUSION

It has been observed that the Indian sports industry includes politics and corruption in the system,which has an influence on the fund disbursement procedure. The decentralised network of blockchain can resolve this question of accountability and transparency. Data management for players has been recommended in order to enable effective talent scouting and better scholarship provision. Blockchain innovations such as smart contracts and tokenization have been proposed as ameans of obtaining pre-professional sporting sponsorships in order to offer a peer-to-peerfundraising system free of government intrusion. Finally, a profitable league culture is targetedthrough the management of broadcasting rights to create larger profits, which will be utilised tooffer financial assistance to future stars.

The practicality of blockchain applications has created new chances and solutions for the reformand growth of the Indian sports industry, while putting players and their financial requirements atthe forefront. The technology's characteristics have addressed key problems about the managementof government funds, their disbursement, and private funding. Furthermore, additional opportunitiesfor an athlete's growth and development have been created.

Therefore, this proposition of blockchain integration serves a meaningful purpose for grassrootsdevelopment in Indian sports by providing financial assistance to Indian athletes.

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APPENDIX

Table 1

INDUSTRY	EXISTING ISSUES	HOW BLOCKCHAIN HELPS
AUTOMOTIVE	Hard to keep track of data due to numerous transactions from the manufacturing and repair of defective parts till after the sale of a car.	Blockchain can help build efficiency, transparency, and trust with a shared, permissioned record of ownership, location, and movement of parts and goods.
BANKING AND FINANCE	Lengthy paperwork, fraudulent activities, and scams are frequent.	Automated compliance, faster settlement, and increased security.
GOVERNMENT	Data leakage and corruption	Secured data sharing, increased transparency, and accountability.
HEALTHCARE	Issues in supply chains to deliver protective equipment and keeping health data secure.	Data integrity amongst multiple parties, full traceability, and operational efficiency.
INSURANCE	Issues pertaining to risk management, subrogation, and frauds.	Automates underwriting and claim settlement to reduce fraud and abuse.
MEDIA	Ticket scalping, high costs, and online advertisement frauds.	Eliminate fraud, reduce costs, and increases transparency.
RETAIL	Mismanagement of supply chain and inventory	Increases operational efficiency and provides sustainable production
TELECOMMUNICATIONS	The constant need to innovate, user experience data privacy, and operational challenges	Data privacy, increased customer experience, efficient operations, and opens door to new technology.
TRAVEL	Complexity, errors, and transactions disputes due to many transactions, flights, and moving parts.	An immutable, trustworthy, secure system that eliminates inconsistencies

Table source: https://www.ibm.com/in-en/blockchain/industries

Table 2

LEAGUE	**INITIATIVE**
INDIAN SUPER LEAGUE (ISL)	-The League has required all teams to contribute Rs. 2 crores per year for the growth of grassroots football • ISL strives to discover skilled men and women within the 6-14 age range. • ISL also collaborates with the Young Champs (Reliance Foundation) that offers residential bursaries to exceptional players between 11 and 14 years.
HOCKEY INDIA	• Ranchi (Ranchi Rays) HIL franchise has shown the willingness to

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LEAGUE (HIL)	provide a platform for indigenous talent and infrastructure. • Dabang Mumbai's squad also holds a preparation camp for club coaches and youngsters from the Maharashtra, Goa, and Gujarat states who are aspiring to hockey as their careers.
PRO KABADDI LEAGUE (PKL)	• PKL franchise in Delhi, Dabang Delhi, camps organized to find talented players in rural Haryana regions and Uttar Pradesh. •The Bengaluru Bulls franchise also aims to support Kabaddi by launching an Academy and a School Activation Program to nurture talent in the grassroots.

Table source: https://assets.kpmg/content/dam/kpmg/in/pdf/2016/10/The-business-sports.pdf

Table 3

SAI scheme	Objective of the scheme	Age group of trainees	No. of centres and strength
National Sports Talent Contest Scheme (NSTC)	To scout sports talent in age group of 8-14 years by adopting schools having good sports infrastructure and record of sports performances	8-14 years	24 adopted schools (including 10 schools to promote indigenous games/arts) and 32 akharas with 1060 trainees (805 boys, 255 girls)
SAI Training Centre Scheme (STC)	To establish SAI training centres at the state level; support state governments providing training infrastructure with SAI sponsored boarding, lodging, scientific training and equipment support	12-18 years	56 centres, 5394 trainees (3807 boys, 1587 girls)
Special Area Games Scheme (SAG)	To build SAI sponsored sports infrastructure for training (playing fields, indoor halls, equipment, support/coaches) in consultation with state governments/UT administration	12-18 years	19 centres, 1676 trainees (961 boys, 715 girls)
Army Boys Sports Company Scheme (ABSC)	Collaborative venture between SAI and the Indian army to leverage sports infrastructure created by the Indian army to achieve sporting excellence	8-16 years	18 centres, 1049 trainees (all boys)
Extension Centres of STC/SAG Schemes	To develop schools and colleges having adequate infrastructure and producing good sports results because of training centres	12-18 years	70 centres, 1183 trainees (775 boys, 408 girls)
Centres of Excellence (COE)	To provide advanced training to top performers at National Championships, at the regional centres of SAI for 330 days in a year	12-25 years	15 centres, 556 trainees (288 boys, 268 girls)
Come and Play Scheme	To optimise utilisation of SAI sports facilities and systematically spot talent to induct under STC/SAG, by allowing young sports enthusiasts to get trained under SAI coaches at a cost of INR45 per month	8-17 years	53 centres, 18195 trainees

Image source:https://assets.kpmg/content/dam/kpmg/in/pdf/2016/10/The-business-sports.pdf