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Impact of Investments in Grass Root Sports Development of India

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Abstract

Sports contribute significantly to community development by engaging individuals, keeping them healthy, and stimulating the economy. In India, the sports landscape is evolving, with greater emphasis on engaging everyone rather than merely showcasing the best players. Initiatives such as Khelo India and CSR initiatives have established how significant funding for local sports is. But there are still a few challenges, such as poor infrastructure, inadequate quality of coaching, and unequal access to resources, making it challenging to develop grassroots sports. This research will explore how various investments in grassroots sport are impacting talent discovery, the development of facilities, and economic contribution. The present paper tries to evaluate the influence of funding from diverse sources, such as government funds, CSR donations, and specific sports programs, on the development of grassroots sports in India. Measuring advancement across participation rates, performance, policy implementation, and economic contribution through a Sports Development Index, the study provides an evaluation of progress. It is important for policymakers, corporations, and sports organisations to know these facets so that they can devise improved strategies and augment a more inclusive sports ecosystem. This paper also tries to evaluate the impact of investments in grassroots sports development. The methodology adopted for the study is secondary data, which was collected from reliable sources such as government documents, company information, and sports organisations. Key

sources are the Ministry of Youth Affairs and Sports (MoYAS), the Ministry of Corporate Affairs (MoCA), and the Sports Authority of India (SAI). The outcome of the study reveals that Special Sports Initiatives significantly affect the Sports Development Index (SDI).

Key words: *Sports Development Index; Special Sports Initiatives; Economic Growth.*

I. Introduction

Sports contribute significantly to society by unifying people, enhancing health, and driving economic growth. In India, the spotlight around sports has moved beyond merely the elite to promoting participation at the grassroots level and nurturing young talent. People can witness this change through initiatives such as Khelo India, coupled with investments from companies and public-private partnerships for talent development and facility improvement. Despite these measures, there are a few challenges as well, such as inadequate infrastructure, lack of quality coaching, and uneven resource distribution. Therefore, this study tries to closely examine how various types of investment, both from the government and private enterprises, are impacting grassroots sports.

This study is necessary because grassroots development of sports is enormous in India, and that's where we identify and build young talent and promote mass games participation. Despite government initiatives like Khelo India, CSR money and special sporting schemes, there is still a question mark on how effective these efforts are in infrastructure development, coaching and overall sporting development. This research will assist in assessing the effect of these investments, maximising resource allocation and determining bottlenecks that are restraining us. By looking at the relationship between funding sources and sports development indicators, the study will provide valuable inputs to policymakers, organisations, and stakeholders to plan their investments better.

Grassroots sports also play a big role in economic growth, employment generation and social inclusion and promote health and fitness across all regions of the country. Understanding these will help bridge the regional gaps in sports infrastructure and participation and create a more inclusive and sustainable sports ecosystem in India. The success of investments in India's grassroots sports development is uncertain. This study seeks to evaluate the impact of

various investments on nurturing talent, enhancing infrastructure, and promoting participation in grassroots-level sports, which also contribute to the economic development of India.

2. Review of Literature

Grassroots sports events are increasingly recognised as a catalyst for urban economic development, with studies highlighting their role in boosting related industries. However, challenges remain in fully leveraging these events for urban growth, requiring concerted efforts from government, organisations, and individuals to ensure effective support and cooperation. (Hou, 2024)

Examine the impact of corporate sponsorship on Indian sports, highlighting its role in boosting performance, player development, and infrastructure. While corporate investments have been transformative, concerns about ethics, urban-rural disparities, and athlete well-being remain. The study stresses the importance of transparent governance, grassroots development, and social responsibility for sustainable corporate involvement. (Assumi et al., 2024)

Attracting foreign direct investment (FDI) in sports development projects can significantly contribute to economic growth by fostering foreign trade and capital formation. This study highlights that favourable conditions, such as banking facilities, low-risk environments, and high returns, encourage FDI, reducing dependence on external debt and foreign aid. Such investments not only boost sports infrastructure but also strengthen the host country's economic resilience and global competitiveness. (Mohamed et al., 2024)

Government policies focusing on grassroots sports development are crucial for fostering talent and promoting widespread participation. Studies have shown that prioritising these programs can improve athletic performance at higher competitive levels. Athletes across various age groups and competitive levels have emphasised the need for such policies to enhance the sports ecosystem. (Farooq and Mughal, 2024)

Analyses the economic impact of sports in India, focusing on how different sports such as cricket, football, kabaddi, and badminton contribute to revenue generation, employment, and related industry stimulation. It also explores the impact of major events such as the IPL and Commonwealth Games on infrastructure, tourism, and social cohesion. The long-term

benefits of sports, including talent development and global recognition, are emphasised as key factors for economic growth and policy development in India. (Shamim, 2024)

The effects of early involvement in talent promotion programs (TPPs) on athletic performance. Findings reveal that early TPP involvement improves short-term junior performance but negatively impacts long-term senior performance, with higher-performing junior athletes starting younger and higher-performing senior athletes starting older. The study highlights potential risks of early specialisation, including injury, burnout, and career termination, emphasising the need to balance early development with long-term athletic success. (Güllich and Barth, 2024)

The optimal investment strategy for Folk Sports Tourism Destination (FSTD) projects involves balancing public and private sector roles. Public capital focuses on infrastructure, while private capital provides services. Subsidies boost public investment and consumer demand but don't impact private investment or service prices. Public sector returns follow an inverted U-shape with subsidy levels, while private sector returns increase steadily. Demand fluctuations further exacerbate return differences between subsidised and unsubsidised projects. (Lv et.al, 2024)

Studies suggest that sports stadiums often have limited economic impacts on metropolitan areas, with localised effects being insufficient to justify public subsidies. The relocation of a professional sports team to a new stadium-anchored development in Cobb County showed a small, statistically insignificant increase in taxable sales, with a significant portion of the spending merely shifting from other local activities. These findings reinforce previous conclusions that sports venues are not effective economic development investments. (Bradbury, 2024)

Funding is a critical yet contentious factor influencing elite sports performance. This study utilised a non-experimental descriptive method, drawing on secondary data from public service websites, yearbooks, and entities linked to elite sports in Chile. By analysing funding through the SPLISS model's pillar 1 framework, it was concluded that while funding is essential, a consistent increase in financial resources alone does not guarantee improved performance in elite sports. (Venegas-Yazigi et al., 2023)

Sports development in Odisha, focusing on underprivileged areas like Bhubaneswar's slums. Their study highlights barriers to participation, including a lack of facilities, poverty, and the need for external support like free coaching. They emphasise that providing infrastructure and community support can significantly boost sports engagement in disadvantaged communities. (Misra and Panda, 2023)

Sports tourism, FDI inflows, and the organisation of mega sports events positively impact economic growth in Arab Gulf nations. Alcohol consumption does not directly correlate with economic growth but shows a positive relationship with sports tourism. Allowing alcohol consumption during sports tourism events could potentially enhance economic development. However, policy decisions should consider the cultural and social implications of alcohol consumption in the region. (Elfakharani and Albaheth, 2023)

This study examines the influence of funding from different sources on the development of grassroots sports in India, such as CSR donations, specific sports programs, government funds, etc.

3. Objectives of the Study

1. To identify the factors affecting grassroots sports development in India.
2. To evaluate the impact of investments in grassroots sports development.

4. Methodology

Secondary data were used for this study. The study spans 17 years from 2008 to 2025, capturing the impact of investments in grassroots sport on India. Government funding, companies' contributions through CSR initiatives and special schemes like Khelo India are included in the data. The research draws data from reliable sources such as government documents, company information, and sport organizations. Key sources are the Ministry of Youth Affairs and Sports (MoYAS), the Ministry of Corporate Affairs (MoCA), and the Sports Authority of India (SAI). These give information regarding budgets, policy, and infrastructural development. The research paper also has a look at Corporate Social Responsibility (CSR) reports of the public and private sector companies mandated by law to disclose their grassroots sports investment. Additionally, speciality programs such as Khelo India and Public-Private Partnership projects provide additional information about sports development activities to the public.

This research examines data to identify how investments have influenced grassroots sport development in India across a period of 17 years, from 2008 until 2025. It applies descriptive statistics to present trends in funding, growth in infrastructure, and rates of participation to provide insights into trends in investments. A Vector Auto Regression (VAR) model facilitates the examination of how various funding sources, such as government budgets, CSR funds, and specific sport initiatives, influence the Sports Development Index (SDI) in the long term.

The research employed a blend of tools for data analysis and collection. Microsoft Excel - Employed for data cleaning, initial descriptive analysis, and organisation, as well as for the construction of the Sports Development Index (SDI). Python - Employed for sophisticated statistical analysis, specifically in conducting Vector Auto Regression (VAR) modelling. The research employs stats models for time-series forecasting, pandas for preprocessing of data, and matplotlib and seaborn for visualisation. This study takes a look at how funding affects grassroots sports in India by using existing secondary data. It looks at how different sources of funding relate to sports development outcomes.

5. Results and Discussion

The study applies descriptive statistics, correlation, regression, and Vector Auto Regression (VAR) modelling in an investigation of the interlink between sources of funds and the Sports Development Index (SDI). Study applies graphs, tables, and trend analysis to interpret results and provide valuable insights. The Sports Development Index (SDI) is a method of measuring the development and advancement of sports in a country, nation, or particular group. It considers various factors influencing sports participation, facilities, finance, and performance. India lacks a Sports Development Index (SDI); for the sake of the study, an SDI index for India is developed.

5.1 Construction of Sports Development Index (SDI)

The Sports Development Index (SDI) is a composite measure designed to evaluate the overall progress of sports in a region based on key performance indicators. A framework for calculating the Sports Development Index (SDI) was referred from ASEAN magazine published in January 2023 as a special issue. The score is figured out using five main areas: Participation (23%), Infrastructure (23%), Performance (23%), Policy & Governance (14%),

and Economic Impact (17%). Each area looks at certain things, like how many people play sports at schools, how easy it is to access facilities, how many medals are won internationally, government policies, and the money sports bring to the economy. Every specific item gets a certain weight, and scores are given from 0 to 10. These scores are then turned into a final score out of 100, with higher numbers showing better results. The final Sports Development Index score is made by adding up all these indicators, giving a clear picture of how sports are developing over time.

Table : 1 SDI Calculator

Category	Indicators	Weight (%)	Score (Out of 10)
Participation (23%)	% of school students in sports	8	Higher % = Higher Score
	Gender & rural inclusivity	7	Balanced = Higher Score
	% of para-athletes & special sports initiatives	8	Higher % = Higher Score
Infrastructure (23%)	State-wise access to sports facilities	23	Better Access = Higher Score
Performance (23%)	Olympic & Asian Games medal tally	14	Higher Tally = Higher Score
	World rankings in key sports	9	Higher Ranking = Higher Score
Policy & Governance (18%)	Implementation of sports policies	8	Effective Policies = Higher Score
	Presence of sports academies & coaching institutes	6	More Academies = Higher Score
	Anti-doping compliance & sports ethics policies	4	Strong Compliance = Higher Score
Social Impact (13%)	Employment generation in sports sector	13	More Jobs = Higher Score

(Source: theaseanmagazine.asean.org)

Table : 2 Sample data of SDI calculation

2024	2024P	2023	2023P	2022	2022P	2021	2021P	2020	2020P	2019	2019P	2018	2018P
4	0.32	5	0.4	4	0.32	4	0.32	6	0.48	7	0.56	7	0.56
7	0.49	7	0.49	7	0.49	7	0.49	6	0.42	5	0.35	5	0.35
9.5	0.76	8	0.64	8	0.64	8.5	0.68	8.5	0.68	8	0.64	6.5	0.52
8	1.84	6	1.38	6	1.38	10	2.3	5.5	1.265	7.5	1.725	6.5	1.495
6.5	0.91	7.8	1.092	9.5	1.33	9	1.26	10	1.4	9.5	1.33	9.5	1.33
7.4	0.666	8	0.72	8.8	0.792	8.2	0.738	8	0.72	7.8	0.702	7.6	0.684
9.5	0.76	9	0.72	9	0.72	8.5	0.68	2	0.16	9	0.72	8.5	0.68
4.5	0.27	4.5	0.27	4.5	0.27	4.5	0.27	6.5	0.39	6.5	0.39	7	0.42
8	0.32	6	0.24	6	0.24	5	0.2	8	0.32	1	0.04	5	0.2
10	1.3	9	1.17	6.5	0.845	6	0.78	5	0.65	9	1.17	8	1.04
74.4	7.636	70.3	7.122	69.3	7.027	70.7	7.718	65.5	6.485	70.3	7.627	70.6	7.279

(Source: Compiled sources of Annual Reports of SAI- Sports Authority of India 2009-2024, www.paralympic.org, static.pib.gov.in, www.nriol.com,www.simplysports.in, www.icc-cricket.com, www.fifa.com, www.badmintonindia.org, https://sportsrankings.world/media-release and Annual Reports of MoYAS)

Table : 3 SDI of India

PARTCULAR	TOTAL POINTS	WEIGHTED SCORE	WEIGHTED SCORE IN 100
2024	74.4	7.636	76.36
2023	70.3	7.122	71.22
2022	69.3	7.027	70.27
2021	70.7	7.718	77.18
2020	65.5	6.485	64.85
2019	70.3	7.627	76.27
2018	70.6	7.279	72.79
2017	70.7	6.818	68.18
2016	64.9	6.256	62.56
2015	65.4	6.321	63.21
2014	55.7	5.663	56.63
2013	63.6	5.919	59.19
2012	65.3	5.915	59.15
2011	57.1	5.489	54.89
2010	53.4	5.366	53.66
2009	52.1	4.939	49.39
2008	51.7	5.023	50.23

(Source: Compiled sources of www.nriol.com and static.pib.gov.in)

Fig : 1 Summary of the results

```
  Summary of Regression Results
==================================
Model:                         VAR
Method:                        OLS
Date:           Mon, 17, Feb, 2025
Time:                      12:41:26
--------------------------------------------------------------------
No. of Equations:         5.00000    BIC:                    36.4328
Nobs:                     16.0000    HQIC:                   35.0584
Log likelihood:          -363.389    FPE:                 1.89220e+15
AIC:                      34.9842    Det(Omega_mle):      3.84994e+14
--------------------------------------------------------------------
```

(Source: Output)

This research examines how sports grow over time with money invested in them using a method known as Vector Auto Regression (VAR). This is a way of analysing how various time-based data are related to each other. The research verifies whether private company support, government investment, and corporate social responsibility investments influence or not the aspects such as the Sports Development Index, rates of participation, and sporting infrastructure. VAR is different from standard regression models in that it treats all the variables as interdependent, thus providing a better representation of cause and effect.

Policymakers have the ability to utilize the insights gleaned to make improved investment decisions that may be able to improve sports growth and participation in the long term.

5.2 Data Analysis Using VAR

The VAR results most likely support the idea that, with time lags and differing degrees of impact, government funding, CSR contributions, and special initiatives all work together to influence SDI. The necessity of consistent and well-thought-out investments in sports development would be highlighted by a clear causal link between budgetary allotments and SDI growth. Special Sports Initiatives have a crucial role in the enhancement of sports development when compared to other factors.

Fig : 2 R-Square Value

```
Coefficients: [-0.0018828   0.00491294 -0.14517757  0.04107033]
Intercept: 50.07964801788781
R-squared: 0.7572146734183156
Adjusted R-squared: 0.6762862312244209
Mean Squared Error: 27.650891537762536
```

(Source: Output)

A consistent commitment to promote sports is shown in the special sports projects, which have grown gradually from Rs.164 Cr in 2008 to Rs.815.32 Cr in 2024. Strong interdependencies between these financial parameters are identified by the VAR model, confirming that long-term sports development and performance are facilitated by a well-funded and carefully managed investment approach.

5.3 Data Set

This data examines 17 years of the Sports Development Index (SDI), between 2008 and 2024, as well as some key financial numbers such as government budgets, private and public CSR spending, and special sports programs. The SDI has trended upward in general, from 50.23 in 2008 to 76.36 by 2024. That indicates that there's been quite a lot of improvement in sports development. The investment levels are secondary source information.

Table : 4 Dataset

SL NO.	YEAR	SDI	BUDGET (CR)	PUB CSR (CR)	PRIV CSR (CR)	SPECIAL INITIATIVES (CR)
1	2024	76.36	2811.53	285.83	16.21	815.32
2	2023	71.22	1907.69	61.51	28.83	795.76
3	2022	70.27	1993	61.84	13.72	749.43
4	2021	77.18	1313.4	56.43	33.05	599
5	2020	64.85	2000	65.85	52.71	612
6	2019	76.27	1381.52	67.83	12.04	615
7	2018	72.79	1393.21	86.34	9.46	395
8	2017	68.18	1078.15	105.02	11.01	495.73
9	2016	62.56	917.32	88.1	10.1	438.2
10	2015	63.21	771.58	56.86	3.35	345.82
11	2014	56.63	866.31	58.11	27.85	386.85
12	2013	59.19	593.16	59.44	14.49	356.45
13	2012	59.15	660.01	56.78	26.97	375.49
14	2011	54.89	2972.61	57.87	16.03	396.42
15	2010	53.66	3350.67	55.84	16.82	214.67
16	2009	49.39	1313.33	64.88	21.16	171
17	2008	50.23	1200	58.65	15.2	164

(Source: compiled sources of Annual Reports of SAI- Sports Authority of India 2009-2024, Annual Reports of MoYAS, Annual Reports of various organizations and www.csr.gov.in)

5.4 Interpretation of VAR Results

The VAR results most likely support the idea that, with time lags and differing degrees of impact, government funding, CSR contributions, and special initiatives all work together to influence SDI. The necessity of consistent and well-thought-out investments in sports development would be highlighted by a clear causal link between budgetary allotments and SDI growth. Special Sports Initiatives have a crucial role in the enhancement of sports development when compared to other factors.

Fig : 3 Equation for Index

```
Results for equation INDEX
=============================================================================================
                                coefficient       std. error           t-stat             prob
---------------------------------------------------------------------------------------------
const                            28.328955        14.220766            1.992            0.046
L1.BUDGET (CR)                   -0.000680         0.001642           -0.414            0.679
L1.PUB CSR (CR)                  -0.015617         0.026946           -0.580            0.562
L1.PRIV CSR (CR)                  0.062961         0.118766            0.530            0.596
L1.SPECIAL INITIATIVES (CR)       0.029498         0.013012            2.267            0.023
L1.INDEX                          0.332889         0.268100            1.242            0.214
=============================================================================================
```

(Source: Output)

- **H1a: There is a positive link between the central budget and the sports development index.**
- **H2a: There is a positive link between public company CSR funding and the sports development index.**
- **H3a: There is a positive link between private company CSR funding and the sports development index.**
- **H4a: There is a positive link between special sports initiative funding and the sports development index.**
- **Impact of Government Budget on SDI:**
- p-value (not significant) = 0.679
- Despite the negative coefficient (-0.000680), BUDGET has little or no impact on INDEX because of the high p-value.

- **Effect of CSR Contributions (Public & Private):**
  - Both Public and Private CSR have p-values greater than 0.05 (5% significance level) which are 0.562 and 0.596 respectively.
  - Even though private CSR shows a positive coefficient (0.062961) it does not affects the SDI directly.
- **Role of Special Sports Initiatives:**
  - p-value = 0.023 < 0.05 (Significant at 5% level)
  - The coefficient (0.029498) suggests that Special Sports initiatives are the only significant factor that positively impacts the SDI.

5.5 Correlation Heatmap

The correlation heatmap sheds light on the relationships between the various variables in the dataset. Of particular note is the very strong positive correlation (0.83) between Special Sports Initiatives and Sports Development Index (SDI), which indicates that as Special Sports Initiatives rise, the Sports Development Index (SDI) tends to rise significantly as well. This is consistent with the regression results, which showed that Special Sports Initiatives is the only variable that had a statistically significant impact on the Sports Development Index (SDI).

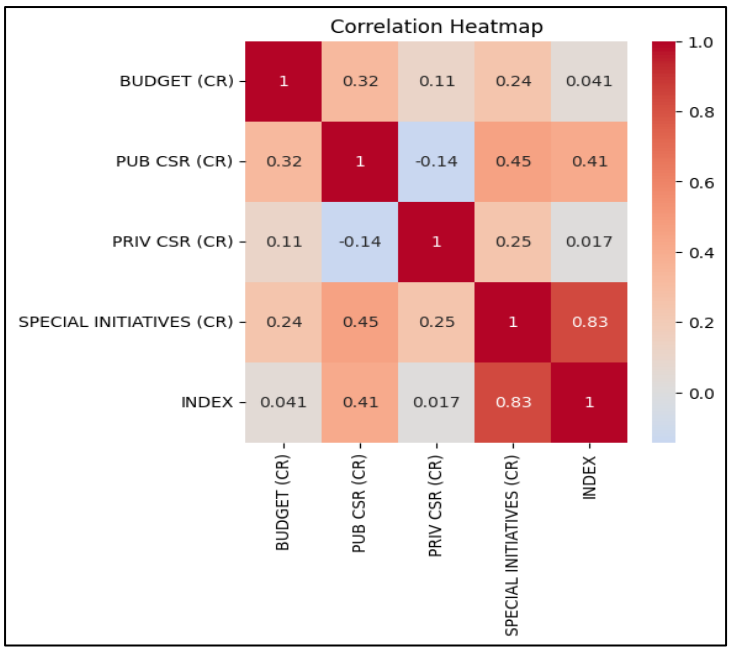
Public company CSR also showed a moderately positive correlation with Sports Development Index(SDI) (0.41), indicating that public company corporate social responsibility investments may have some influence on the Sports Development Index(SDI), although the regression analysis did not find it to be statistically significant; meanwhile,

Central budget had a very weak correlation with Sports Development Index(SDI) (0.041), confirming the regression finding that budget does not significantly affect Sports Development Index(SDI).

The connection between private company CSR and the Sports Development Index (SDI),is the poorest (0.017), suggesting that private company CSR donations have little to no direct effect the Sports Development Index(SDI). Furthermore, Private company CSR and public company CSR have a somewhat negative association (-0.14), indicating that rising public CSR may not always coincide with rising private company CSR expenditure.

Overall, the heatmap demonstrates that Special Sports Initiatives have a significant impact on the Sports Development Index (SDI), whereas correlations between other variables are either weak or non-existent. Accordingly, future plans should concentrate more on Special Sports Initiatives rather than mainly depending on private company CSR, public company CSR, or the central budget to raise the Sports Development Index (SDI).

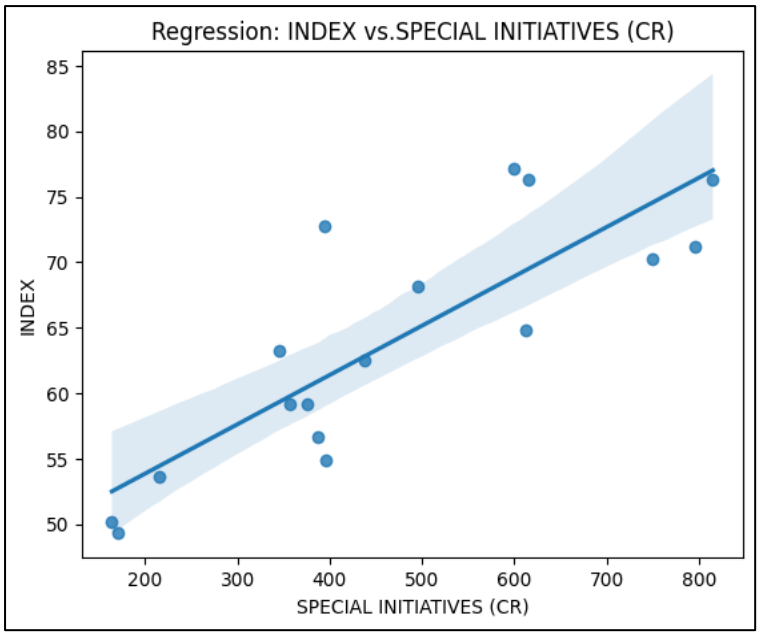
Fig : 4 Correlation heatmap



(Source: Output)

5.6 Regression Line

Fig : 5.5 Regression line



(Source: Output)

The regression analysis suggests a positive correlation between Special Sports Initiatives and the Sports Development Index (SDI), indicating that as spending on Special Sports Initiatives increases, the Sports Development Index (SDI) also tends to rise. The regression line shows a clear upward trend, suggesting a predictive relationship. However, the spread of data points around the line implies some variability, meaning other factors may also influence the Sports Development Index (SDI). The shaded confidence interval further highlights the uncertainty in predictions, with some outliers deviating significantly from the trend.

6. Conclusion

This study's theoretical framework examines the connection between grassroots sports development and financial investments, emphasizing the ways in which money affects long-term sports performance, athlete engagement, and infrastructure. It looks at important independent factors such as public funding, corporate social responsibility (CSR) expenditures, and private sector donations and how these affect the dependent variable, which is the expansion of grassroots sports. The foundations of the research are the Economic Growth and Sports Development Model, CSR Theory and Sports Development Theory explaining how systematic investments and policymaking enhance sports environments.

The factors affecting grass root sports development are Infrastructure Development, Performance, Participation, Employment generation and Policy of governments. The p-value = 0.023 (< 0.05) indicates that Special Sports Initiatives have a statistically significant impact on the other Sports Development Index (SDI). This suggests that targeted sports programs and investments directly contribute to grassroots sports growth. Central Budget, Public company CSR and Private Company CSR do not show a significant impact on SDI in the VAR model. This could indicate that while these factors are essential, their influence might be indirect or influenced by other unobserved variables. The R-squared value of 0.7572 means that 75.72% of the variation in SDI is explained by the independent variables in the model. This indicates a good fit, but some variation remains unexplained, suggesting other external influences on sports development. The regression equation found through the VAR model can be used to predict the Sports Development Index (SDI) in the future by considering other factors. The regression equation is;

INDEX = 50.0795 - 0.0018828×BUDGET + 0.00491294×PUB CSR - 0.14517757×PRIV CSR +

With a p-value of 0.023, the study finds that Special Sports Initiatives significantly affect the Sports Development Index (SDI), whereas other elements such as government policies, infrastructure, performance, participation, and employment creation do not directly exhibit statistical significance. Although special initiatives are important, other unconsidered factors may also have an impact on sports development, as indicated by the model's R-squared value of 0.7572, which shows that it explains 75.72% of the variation in SDI. These results highlight the necessity of more funding for focused sports initiatives as well as an all-encompassing strategy that incorporates infrastructure upgrades, regulatory changes, and athlete development tactics to guarantee grassroots sports' sustained growth.

Some of the recommendations of this research are to boost investments in grass root sports through special sports initiatives, such as increasing funding for infrastructure, coaching, and talent development, promote Public-Private Partnerships (PPPs) for corporate investment in sports academies and leagues and focus on underprivileged areas for equal opportunities. Another suggestion of this study is to optimise sports budget allocation through the way of distribute funds strategically for maximum impact use data-driven evaluation for effective

spending, and ensuring budget transparency to prevent inefficiencies. Enhancing CSR funding for sports activities is one of the important recommendations of this research, such as regularly assessing corporate CSR impact on grassroots sports, shifting to performance-based CSR funding models and encourage long-term corporate commitments for sustainability.

Measuring advancement in the scope of participation rates, performance, policy implementation, and economic contribution through a Sports Development Index, the study provides an evaluation of the progress made. It is important for policymakers, corporations, and sports organizations to know these facets so that they can devise improved strategies and augment a more inclusive sport ecosystem.

References

Assumi, K.H., Choudhury, R.D., Nath, S.C. and Dutta, P.P (2024) 'Corporate influence in Indian sports: An in-depth exploration', International Journal of Applied Research, 10(2), pp. 103–110. Available at:https://doi.org/10.22271/allresearch.2024. v10.i2b.11536.

Bradbury, J.C., 2022. 'Does hosting a professional sports team benefit the local community? Evidence from property assessment', Economics of Governance, 23(3), pp.219-252. Available at: https://doi.org/10.1007/s10101-022-00268-z.

ELfakharani, A.M. and Albaheth, H.E.(2023) 'Examining the Link Between Sports Tourism, FDI Inflow, Economic Growth, and FDI Inflows: Does Legal Restrictions on Alcohols Consumption During Sports Events Matter?' Revista de Psicología del Deporte (Journal of Sport Psychology), 32(1), pp.207-219.

Farooq, I. and Mughal, R.A. (2024) 'The importance of government policies in prioritizing grassroots sports programs', International Journal of Physical Education, Sports and Health, 11(4), pp.160-162. Available at: http://www.kheljournal.com.

Güllich, A. and Barth, M. (2024) 'Effects of Early Talent Promotion on Junior and Senior Performance: A Systematic Review and Meta-Analysis', Sports Medicine, 54(3), pp. 697– 710. Available at: https://doi.org/10.1007/s40279-023-01957-3.A

Hou, Z. (2024) ‘How Grass-roots Sports Events in the New Era Can Promote Urban Economic Development’, SHS Web of Conferences, 193, p. 01040. Available at: https://doi.org/10.1051/shsconf/202419301040.

Lv, X., Deng, B. and Deng, K. (2024) ‘Dynamic investment strategies for a folk sports tourism destination under uncertain demand’, RAIRO - Operations Research, 58(3), pp. 2321–2337. Available at: https://doi.org/10.1051/ro/2024088.

Misra, Y.V. and Panda, B.K.(2023) ‘Diamonds in The Mud–Searching For Sports Talent In The Slums Of Bhubaneswar’, Research journal of Berhampur university, 5, pp.47-51.

Mohamed, S.A.L.M., Sayyd, S.M.K. and Ghreeb, M.S.M. (2024) ‘Inviting foreign direct investment for sports development projects in relation to economic development and development challenges’, Sport TK, 13, pp. 1–19. Available at: https://doi.org/10.6018/sportk.624801. 31.

Shamim, P. (2021) ‘Sports and economic development: A case study of the Indian emerging market’, Journal of Emerging Technologies and Innovative Research (JETIR), 8(6), pp. 747–754. Available at: https://www.jetir.org.

Venegas-Yazigi, Bossay-Salinas, Cofré-Bolados, Mazzei and Duclos-Bastías (2023) ‘Analysis of the Public Financial Investment in Elite Sport in Chile’, Movimento, 29, pp. 1–19. Available at: https://doi.org/10.22456/1982- 8918.126532.

APPENDIX

1) PYTHON CODES FOR REGRESSION

```
import pandas as pd
import numpy as np
from sklearn linear_model import Linear Regression

# Assuming your data is in a Data Frame called 'data'
# 1. Prepare the data
X = data[['BUDGET (CR)', 'PUB CSR (CR)',
      'PRIV CSR (CR)', 'SPECIAL INITIATIVES (CR)']]  # Independent variables
y = data['INDEX']  # Dependent variable

# 2. Create and train the model
model = Linear Regression ()
model.fit(X, y)

# 3. Calculate metrics and print summary
y_pred = model.predict(X)  # Predictions on the entire data
residuals = y - y_pred
n = len(y)  # Number of observations
p = X.shape[1]  # Number of predictors
dof = n - p - 1  # Degrees of freedom
sse = np.sum(residuals**2)  # Sum of squared errors
sst = np.sum((y - np.mean(y))**2)  # Total sum of squares
r_squared = 1 - (sse / sst)  # R-squared
adj_r_squared = 1 - (1 - r_squared) * (n - 1) / dof  # Adjusted R-squared
mse = sse / dof  # Mean squared error


# Print summary
print('Coefficients:', model.coef_)
print('Intercept:', model.intercept_)
print('R-squared:', r_squared)
print('Adjusted R-squared:', adj_r_squared)
print('Mean Squared Error:', mse)
# ... (Add other desired statistics)
```

2) PYTHON CODES FOR VAR

```
import pandas as pd
import statsmodels.api as sm
```

```
# Assuming your data is in a DataFrame called 'data'
# 1. Prepare the data
data_var = data[['BUDGET (CR)', 'PUB CSR (CR)',
      'PRIV CSR (CR)', 'SPECIAL INITIATIVES (CR)','INDEX']]  # Select relevant
columns

# 2. Create and fit the VAR model
model = sm.tsa.VAR (data_var)
results = model.fit (maxlags=1, ic='aic')  # Determine optimal lag order using AIC

# 3. Print the model summary
Print (results.summary())
```

3) SDI CALCULATION INPUTS

Table A1 - Participation and Gender Inclusivity data

YEAR	NO. OF STC	BOYS	GIRLS	TOTAL
2023-24	186	5264	3375	8639
2022-23	187	5704	3728	9432
2021-22	188	4969	3029	7998
2020-21	188	5681	3544	9225
2019-20	276	8219	3678	11897
2018-19	273	9967	4269	14236
2017-18	287	10481	4426	14907
2016-17	289	9653	4031	13684
2015-16	252	8243	3530	11773
2014-15	250	7594	3438	11032
2013-14	229	7629	3188	10817
2012-13	228	7919	3360	11279
2011-12	308	9893	4227	14120
2010-11	300	9676	4061	13737
2009-10	292	9424	3385	12809
2008-09	293	9319	3657	12976
TOTAL				188561

(Source: Annual Reports of SAI- Sports Authority of India 2009-2024)

Table A2 - Para Athletic Championship data

YEAR	GOLD	SILVER	BRONZE	TOTAL	RANK	SDI
2008	0	0	0	0	0	0
2011	0	1	0	1	55	2.5
2012	0	1	0	1	67	6
2013	1	0	0	1	33	7
2015	0	2	0	2	50	5
2016	2	1	1	4	43	7
2017	1	2	2	5	34	6.5
2019	2	2	5	9	24	8
2020	5	8	6	19	24	8.5
2023	3	4	3	10	19	8
2024	6	5	6	17	6	9.5
2024	7	9	13	29	18	9

(Source: www.paralympic.org)

Table A3 - Sample Data for State wise Infrastructure Development

Sl No	STATE / UT	2023-24	2022-23	2021-22	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16
1	Andaman and Nicobar Islands		1		1				1	
2	Andhra Pradesh	2	1	2	2			5	2	
3	Arunachal Pradesh	4		3	1	2	13	1		5
4	Assam		1		1	5	1	5		2
5	Bihar	2		5	10				3	
6	Chhattisgarh	0	1	3	3			1	1	2
7	Delhi	1	1	1	1	8			2	
8	Goa	3		1	4				4	2
9	Gujarat	2		2			1	3	2	
10	Haryana		4	2	2	2		5	3	1
11	Himachal Pradesh	1	3	3	3	2	1		2	3
12	Jammu & Kashmir	2		1	1	3		1		1
13	Jharkhand	1	1		1		1		3	
14	Karnataka	8	9	6	7	2	5	4	2	4
15	Kerala	1		2	2	2	1	4	3	5
16	Ladak	2			3		1			
17	Lakshadweep	1			2					1
18	Madhya Pradesh	7	12		6	2	3	4	4	
19	Maharashtra	1	3		2	5	4	3	2	6

Sl No	STATE / UT	2023-24	2022-23	2021-22	2020-21	2019-20	2018-19	2017-18	2016-17	2015-16
20	Manipur	2		3	2	1	4	3		2
21	Meghalaya		3		6				1	2
22	Mizoram	4	3	2	2	3		2	1	
23	Nagaland	2	3		5	1		2		1
24	Odisha	8	1		5	1	1	4	2	
25	Puducherry		1		1		1			
26	Punjab	2	3	5	3	5	1	2	2	1
27	Rajasthan		2		2	9	15	9	3	1
28	Sikkim	1	1	3	3		1		2	
29	Tamil Nadu	3	2	1	3		2	3	1	3
30	Telangana	4		4	3		1	1		
31	Tripura	2	3	2	3			1	1	
32	Uttar Pradesh	12	6	16	16	2	23	1	3	4
33	Uttarakhand	3		1	2	2		3		2
34	West Bengal	3				1	1	1	3	2
	TOTAL	**84**	**65**	**68**	**108**	**58**	**81**	**68**	**54**	**50**

(Source: static.pib.gov.in)

Table A4 - Performance of India in World Championships

Year	Rank	Gold	Silver	Bronze	Total	Participants	Sdi
2008	1	33	26	17	76	71	10
2009	51	1	0	2	3	204	7.5
2010	2	38	27	36	101	63	10
2011	9	3	3	3	9	64	8.5
2012	57	0	2	4	6	204	7.5
2013	-	-	-	-	-	-	8
2014	8	11	10	36	57	45	8.5
2015	5	9	4	6	19	65	9.5
2016	67	0	1	1	2	207	7
2017	7	4	1	6	11	64	9
2018	5	15	30	19	64	71	9.5
2019	-	-	-	-	-	-	9.5
2020	4	1	2	4	7	206	10
2021	-	-	-	-	-	-	9
2022	4	22	16	23	61	68	9.5
2023	17	0	2	3	5	71	7.8
2024	71	0	1	5	6	204	6.5

(Source: www.nriol.com)

Table A5 - World Ranking of India in Key Sports

Sports	Cricket	Football	Badminton	Hockey	Kabbadi	Avg Sdi
2025	10	4	7	9	7	7.4
2024	10	4	7	9	7	7.4
2023	10	5	8	10	7	8
2022	10	5	10	10	9	8.8
2021	10	5	9	9	8	8.2
2020	10	5	8	9	8	8
2019	10	4.5	7.5	9	8	7.8
2018	10	5	7	9	7	7.6
2017	10	4.5	6.5	9	6	7.2
2016	10	3.5	6	9	6	6.9
2015	10	2.5	6	9	7	6.9
2014	10	2	6	9	9	7.2
2013	10	2.5	6	8	9	7.1
2012	10	2.5	7	8	8	7.1
2011	10	2.5	6	8	9	7.1
2010	10	3	7	8	9	7.4
2009	10	3.5	6	8	8	7.1
2008	10	3	5	7	6	6.2

(Source: www.icc-cricket.com , www.fifa.com , www.badmintonindia.org)

Table A6 - Sports Policy Implementation Ranking

Year	Rank	Points	Sdi
2014	43	20,467	8
2015	36	54,225	8
2016	31	80,789	8.5
2017	35	1,48,663	8
2018	32	3,34,643	8.5
2019	23	3,27,503	9
2020	-	-	2
2021	28	3,10,425	8.5
2022	23	3,67,243	9
2023	19	4,67,301	9
2024	16	4,88,616	9.5

(Source: https://sportsrankings.world/media-release)

Table A7 - Ethics & Antidoping Compliances

Year	Test	Positives	Fund Expended	Sdi
2008-09	2100	12	5,75,00,000	4
2009-10	4525	17	15,50,00,000	1
2010-11	7175	25	14,00,00,000	4
2011-12	2508	76	3,50,00,000	9
2012-13	2945	119	7,00,00,000	9
2013-14	4445	9	8,30,00,000	1
2014-15	4700	70	11,60,00,000	8
2015-16	3400	48	12,00,00,000	7
2016-17	1969	55	2,80,00,000	9
2017-18	4000	39	14,15,00,000	5
2018-19	4348	18	17,50,00,000	1
2019-20	2712	71	13,00,00,000	8
2020-21	104	72	22,47,00,000	5
2021-22	3865	125	34,00,00,000	6
2022-23	3243	84	24,35,00,000	6
2023-24	4342	142	24,30,00,000	8

(Source: Annual Reports of MoYAS)

Table A8 - Employment Generation

Year	Employability	Percentage	Sdi
2000	61,200	0.443478261	4.5
2001	37650	0.272826087	3
2002	59050	0.427898551	4
2003	57600	0.417391304	4
2004	64200	0.465217391	4.5
2005	69340	0.502463768	5
2006	76840	0.556811594	5.5
2007	78650	0.569927536	5.5
2008	74260	0.538115942	5.5
2009	82740	0.599565217	6
2010	75320	0.545797101	5.5
2011	89740	0.650289855	6.5
2012	93600	0.67826087	6.5
2013	100000	0.724637681	7
2014	83670	0.606304348	6
2015	99730	0.722681159	7
2016	102030	0.739347826	7
2017	94180	0.682463768	7
2018	112060	0.812028986	8
2019	122250	0.885869565	9
2020	67490	0.489057971	5
2021	80490	0.58326087	6
2022	91840	0.665507246	6.5
2023	123460	0.894637681	9
2024	1,38,000	1	10

(Source: www.simplysports.in)