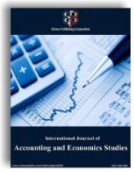
International Journal of Accounting and Economics Studies, 12 (6) (2025) 457-466

International Journal of Accounting and Economics Studies

Website: www.sciencepubco.com/index.php/IJAES
https://doi.org/10.14419/vwxssf65
Research paper



Factors Influencing Sports Performance Outcomes in India: Examining Training, Governance, and Socio-Cultural Factors

Kayaan Desai1 [1], Dr. Vatsal Patel [2], Dr. Pratha Jhala [2] *, Dr. Dhaval Maheta [3], Dr. Janki Mistry [3], Dr. Keren Kirit Khambhata [4], Ms. Vishwa Bhatt [5]

[1] Fountainhead School, Surat, India
[2] Assistant Professor, Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat, India
[3] Professor, Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat, India
[4] Assistant Professor, Auro University, Surat, India
[5] Research Scholar, Department of Business and Industrial Management, Veer Narmad South Gujarat University, Surat, India
**Corresponding author E-mail: psjhala@vnsgu.ac.in*

Received: August 14, 2025, Accepted: September 19, 2025, Published: October 12, 2025

Abstract

This study examines the impact of training, governance, and socio-cultural factors on sports performance outcomes in India. A quantitative approach was employed, utilizing a structured questionnaire with a sample of 303 athletes, coaches, administrators, and enthusiasts. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for data analysis. The model demonstrated acceptable reliability and validity, with strong internal consistency (Cronbach's alpha > 0.7, composite reliability > 0.8) and convergent validity (AVE > 0.5). Discriminant validity was established using the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio. The model explained 69.9% of the variance in performance outcomes ($R^2 = 0.699$). Socio-cultural environment had the strongest effect ($f^2 = 0.280$), followed by competition exposure ($f^2 = 0.102$). Predictive relevance was confirmed with positive Q^2 values. Path analysis revealed significant relationships between performance outcomes and socio-cultural environment ($\beta = 0.452$, $p < 0.001$), competition exposure ($\beta = 0.255$, $p < 0.001$), and training and development ($\beta = 0.138$, $p = 0.004$). These findings are interpreted through the lens of human capital theory and cost–benefit analysis, highlighting that socio-cultural and competitive factors function as non-monetary externalities influencing labor supply into sports. The results suggest that infrastructure and financial inputs exhibit diminishing returns unless complemented by strategic governance and skill investment. By embedding sports development within economic frameworks such as ROI on public spending, opportunity costs of athlete training, and market inefficiencies in talent allocation, the study provides actionable insights for designing efficient public–private partnerships in India's sports sector. A holistic approach combining physical infrastructure with intangible developmental inputs is recommended for effective public-private partnerships in the Indian sports sector.

Keywords: *Competition Exposure; Governance; Human Capital Theory; Socio-Cultural Environment; Sports Performance.*

1. Introduction

Sports have long been an integral part of human civilization, serving not only as a form of recreation but also as a powerful means of cultural expression, national identity, and global diplomacy. From ancient Olympic Games in Greece to the modern-day global sports industry, the domain of sports has evolved into a multifaceted ecosystem involving economics, governance, policy-making, and international cooperation. In the contemporary context, the global sports industry has become a multi-billion-dollar sector. As per estimates by AT Kearney (2011), it contributes significantly to global GDP through broadcasting rights, sponsorship, ticketingmodern-day, and merchandising. PricewaterhouseCoopers (PwC, 2025), the global sports market—currently valued at approximately $600 billion—is projected to expand further at an annual growth rate of 8.7% through 2026.

1.1. Evolution and history of sports in India

Sports in India can be traced back to antiquity, as demonstrated by archaeological evidence and written records documenting various physical activities, such as archery, wrestling, charioteering, and yoga, existing during the Vedic and Epic periods. In particular, texts, such as the Mahabharata, Ramayana, and Dhanurveda mention the regimented training of soldiers in fighting forms and physical discipline.

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Traditional Indian sports, including kabaddi, mallakhamb, kushti (wrestling), chess (originally chaturanga), and a variety of martial arts-based events (e.g., Kaliyanpattayum originated from Kalaripayattu), persisted across each historical epoch. While these events provided physical entertainment by maintaining fitness, they were also integrated into the social and cultural milieu of the Indian way of life. When colonialism took hold of India, British administrators brought new sports to India, such as cricket, football, hockey, and tennis; however, these activities were typically developed in schools, military cantonments, and clubs. While India had early successes in national events and leagues (e.g., field hockey dominated the Olympic stage from 1928 to 1956), attempts to formalize sport in India post-independence were sporadic and bureaucratic in nature. Ultimately, India's first National Sports Policy was introduced in 1984 and revisions followed in 2001 and 2007 to improve (a) mass participation; (b) social and sporting infrastructure; and (c) excellence in competitive sport. There have been many barriers to execution and not to mention theft, along with a lack of professional governance that needs contextualization.

1.2. The current state of Indian sports governance

The Indian government has, in the past few years, embraced sport as a mechanism for youth engagement, national prestige, and health promotion. However, despite all of these advances, the country's record for performance on international platforms, such as the Olympics, has been somewhat lackluster. India has only secured 36 Olympic medals since independence, which is minuscule compared to Olympic powerhouses like the USA or China. It is noteworthy that in the 2024 Commonwealth Games, India even fell behind countries with smaller populations and fewer resources, which indicates the sport's system is riddled with inefficiencies in management and governance. Many National Sports Federations (NSFs), the Indian Olympic Association (IOA), the Ministry of Youth Affairs and Sports (MYAS), and the SAI are in charge of running sports in India. Though their intentions may be to develop and promote sport in the country, they are reported to have political involvement, with low levels of transparency, poor management of finances, and an overall lack of athlete care (Patil, 2024). Cricket is perhaps an exception to this remark, administered by the Board of Control for Cricket in India (BCCI), given its deep pockets and relative organizational competence, even though it has its own issues of governance.

1.3. International perspectives and the Western governance benchmark

An official, open, and athlete-centered system for governing sports exists in Western countries like the UK, the US, and EU countries, but not in India. Regulations for fair play control the Football Association (FA) and the Premier League in the UK. In the US, none of the major teams are managed by RFCs. Additionally, the US has a legal regime regulating sports played under collegiate (NCAA) or professional sports competitions. UK governing bodies UEFA and FIFA have governed fair play guidelines and referee dispute regimes, and disputes between players and clubs. Each of these models has several aspects in common, defined governance structure with some independence and arbitration or dispute process; income creation or revenue generation to equity; and a development pathway to recruit amateur talent youth to participant and athlete, including developing a path and amateur or adult sport. As a result, at an aggregate level, Western countries have international success relative to India, not only related to athlete preparation, but also in the governance system of the sport that will support the athletes.

1.4. Elite performance through policy: a comparative analysis of BRICS sports development models

Sports development in China is centered on the “Juguo Tizhi” or "Whole Nation System," a centralized system dominated by the government that seeks to generate national resources to identify and develop elite athletes at a young age through a national network of specialized sports schools (Li et al., 2023). Thus, China is focused on obtaining international success, particularly in the Olympics. This system is defined by strong financial support from the government, institutionalized athlete identification processes, science-based training models, and little interference with (sport technical) processes so that organizations can remain streamlined and focused on winning (Li et al., 2023). Other BRICS countries, such as Russia, also display the centralized model to an extent due to the culturally embedded discourse of using sport as a symbol of global strength from the Soviet period. Russia’s approach emphasizes long-term planning, robust infrastructure, and a clear separation between administrative and coaching functions, facilitating high-performance outputs (Han & Zou, 2024). Brazil, too, despite facing economic challenges, has invested significantly in sports infrastructure and community engagement, especially during and after hosting the 2016 Olympics. In contrast, India’s sports governance has historically been fragmented and reactive, with responsibilities scattered across multiple agencies. While recent initiatives such as Khelo India, Target Olympic Podium Scheme (TOPS), and the Fit India Movement reflect a shift toward professionalization and inclusivity, executional gaps persist due to underutilized budgets, political interference, and infrastructural inadequacies (Khatri, 2025; McLeod et al., 2021). Furthermore, India’s low public expenditure on sports—approximately 0.1% of GDP compared to over 1% in China and Russia—demonstrates its relatively lower prioritization of sports in national planning. Therefore, the superior sporting performance of countries like China, Russia, and Brazil is not incidental, but the result of structured, well-funded, and performance-oriented ecosystems. India, by contrast, is still in the process of developing a cohesive and accountable sports framework that balances grassroots participation with elite athlete development (Jha, 2024; Li et al., 2023).

1.5. Research rationale and need for reform

Despite India’s rich sporting legacy and a vast talent pool, structural flaws in governance have created barriers to success. Core issues include excessive centralization, politicization of federations, limited private investment, and inadequate legal frameworks. Inadequate attention to athlete welfare, career progression, and dispute resolution further hinders holistic sports development. The government's budget allocation to sports—although increasing in absolute terms—still represents less than 0.1% of the total budget, reflecting a lack of prioritization (Patil, 2024). Given these issues, there is an urgent need for a systemic reform of India's sports governance framework by drawing lessons from successful global models. The goal of this study is to look at Indian and Western government systems side by side to find gaps, figure out what changes could be made, and come up with a plan for how to change sports management in India.

2. Review of Literature and Conceptual Framework

An organized two-phase method has been used in previous studies to look into how the Resource-Based View (RBV) relates to the sports business. First, a systematic literature review was conducted using targeted keyword searches in the Elsevier Scopus database, focusing on the intersection of “sport” and RBV-related terms such as “competitive advantage.” Studies centered on sports sponsorship and equipment

manufacturing were excluded to maintain thematic relevance. The remaining literature was examined in detail, including cross-referencing, to map existing knowledge on value-creating resources within sports organizations, teams, leagues, and events.

2.1. Sports performance research evolution

Over the past 40 years, the literature on sports performance has transformed from an emphasis on the physiological and psychological aspects of athletes as individuals to a more all-encompassing examination that involves organizational, economic, and social dimensions (De Bosscher et al., 2006; Truyens et al., 2014). The early investigation was focused on improving modes of training, quantifying physical ability, and measuring psychological readiness. In recent research, on the other hand, systemic and structural factors like policy settings, talent recognition and development systems, and government structures have been given more attention.

This progression shows a clear shift in realizing that sports performance is not merely a result of what individuals do, but is more socially located and linked to a larger context, and institutional support (Green & Oakley, 2001). An additional research trend worth noting is the increase in interest in comparative cross-national research as some researchers attempt to understand why some countries are better than others, even with the relatively similar contexts and resource constraints. Engaging with this increasing body of work is important, as it contributes to the development of a more comprehensive model to improve national sports outcomes (Houlihan & Green, 2008).

2.2. Theoretical foundations in sports performance research

2.2.1. Systems theory applications

Systems theory offers a cohesive lens through which to examine the interrelations between the various subcomponents that comprise sports ecosystems in their contribution to performance outcomes (Von Bertalanffy, 1968). The theory views sports performance as a function of complex interdependencies among components such as coaching quality, athlete development, sports infrastructure, funding mechanisms, and governance systems.

Research that is informed by systems theory often examines mismatches or disruptions within national sporting systems (Oakley & Green, 2001). Again, using the example above, even if a country has sufficiently developed its coaches, the athletes still cannot fulfill their potential if they do not have the right facilities or governance around the sporting experience. So, an effective sporting system within a country is a result of how the components of the system function together (De Bosscher et al., 2015).

2.2.2. Human capital theory

Human capital theory, developed first by Schultz (1961) and Becker (1964), provides an important rationale for investing in people to enhance productivity and performance. In a sports context, human capital refers to athletes, coaches, administrators, and support staff. The theory highlights the importance of ongoing investment in training, education, or skills development as a means to improve competitive success.

Academic researchers have utilized this theory to account for differences in athletic performance between nations by pointing to the magnitude of formal training, experienced coaching staff, and access to supportive services like sports psychology and nutrition (Balyi & Hamilton, 2004). The theory posits that a nation's ability to develop and retain high-quality human capital has a substantial effect on its international sports performance (De Bosscher et al., 2006).

2.2.3. Resource-based view theory

Barney came up with the Resource-Based View (RBV) in 1991. He says that businesses, like sports schools, can stay ahead of the competition if they have and use valuable, rare, unique, and non-substitutable (VRIN) resources. When it comes to sports, we can look at tools like venues, teachers, past competition, private knowledge, and institutional knowledge.

RBV emphasizes internal strengths and capabilities over external market conditions. Studies applying RBV in sports reveal that long-term success is often a function of how well national systems develop and exploit strategic resources (Smart & Wolfe, 2003; Robinson & Minikin, 2012). Nations that treat sports performance as a result of strategic resource management—rather than relying on sporadic talent—tend to demonstrate more consistent international success.

2.2.4. Economic and financial perspectives in sports research

Sports outcomes can also be understood through economic theory. Labor economics views athletes as participants in a specialized labor market, where wage disparities, career uncertainty, and migration opportunities shape supply decisions (Rosen & Sanderson, 2001). Human capital theory (Becker, 1964) emphasizes the returns to investment in training, education, and nutrition, framing athlete development as a long-term productivity-enhancing investment. From a public finance perspective, state expenditure on sports can be assessed through cost–benefit analysis, balancing medal tallies, tourism, and health spillovers against budget allocations. Furthermore, ROI frameworks evaluate whether PPP-based investments in stadiums, academies, and tournaments generate measurable economic and social returns (Baade & Matheson, 2016). These perspectives highlight that sports performance is not merely cultural or institutional, but an outcome of rational economic choices and resource allocation efficiency.

2.3. Training and development systems

Training and development systems are foundational to the creation of high-performance athletes, comprising a range of interrelated elements including talent identification, coaching methodologies, long-term athlete development, and sports science integration. Talent identification, as stated by Vaeyens et al. (2008), is a multifactorial and dynamic process that must be more than just individual physical indicators, by also considering psychological measures and longitudinal observation. Balyi's (2001) Long-Term Athlete Development (LTAD) model provides a systemic structure for supporting talent from early childhood to elite levels through appropriate training, competition exposure, and psychological readiness at every stage of development.

At the heart of this system is the quality of coaching, which is outlined by Côté and Gilbert (2009) by three key domains: Professional knowledge, interpersonal communication, and intrapersonal reflection. Evidence-based literature shows that countries that enforced national coaching qualifications, consistent professional development, and support from their sports system achieve higher performance

outcomes (Lyle & Cushion, 2010). The increased involvement of sports science in coaching practice has also maximized training efficiency with biomechanical analysis, data monitoring, and physiological measurement of training regularly features in elite sport (Reid et al., 2004). National sports systems in Australia, the UK, and Germany have introduced sports science provision into their sports system, which connects to improvement of international performance outcomes (De Bosscher et al., 2006).

In the Indian context, despite abundant raw talent, systemic weaknesses—such as inconsistencies in coaching quality, insufficient scientific input, and fragmented development pathways—have constrained athletic achievement. Theoretical foundations such as the Resource-Based View (RBV) highlight high-quality coaching, scientific training, and development pathways as valuable, rare, and inimitable resources that contribute to sustained competitive advantage (Barney, 1991). Human Capital Theory (Becker, 1964; Schultz, 1961) reinforces the need for continuous investment in the development of both athletes and their support systems. Systems Theory (von Bertalanffy, 1968) further positions training and development as an interconnected subsystem, which must function in alignment with other elements like infrastructure, governance, and competition to optimize national sports performance.

Hypothesis 1 (H1): Training and Development Systems have a significant positive relationship with Performance Outcomes.

2.4. Infrastructure and resources

Infrastructure and resources play a pivotal role in shaping athletic performance by influencing access to high-quality training environments, advanced equipment, and equitable geographical distribution. The availability and quality of sports facilities must meet international standards to support elite athlete development; mere access is not sufficient (Truyens et al., 2014). Inequities in urban and rural India's infrastructure compound issues in identifying and developing talent, with a centralized approach to developing facilities often constraining opportunities in more peripheral locations (Green, 2007). The lack of investment in maintaining and refreshing infrastructure is an additional barrier for athlete advancement. Access to equipment and modern technology specifically designed for sport is also necessary. Research reveals that performance 'gaps' can often be attributed to unequal access to technology (Bishop, 2008). This is particularly true in sports where small technological advantages are meaningful, such as swimming and track and field. Additionally, the inclusion of technology can require substantial resources, which presents a barrier for many developing nations (Truyens et al., 2014). In response to this barrier, public-private partnerships or shared resource banks can allow for collective funding and development of shared technology (Truyens et al., 2014).

Efficient allocation of resources also plays a role in national sports success; studies have shown that targeted and strategic investments yield greater returns than a blanket funding philosophy (De Bosscher et al., 2009). Sustainable funding sources (i.e., not solely dependent on sporadic government initiatives) provide a more reliable and continuous means of support at different stages of athlete development. From a theoretical standpoint, the Resource-Based View (RBV) identifies infrastructure and equipment as tangible, non-substitutable resources vital for sustained competitive advantage (Barney, 1991). Systems Theory (von Bertalanffy, 1968) further conceptualizes infrastructure as a core subsystem that underpins the effective functioning of all other performance domains—including training, coaching, competition exposure, and governance.

Hypothesis 2 (H2): Infrastructure and Resources have a significant positive relationship with Performance Outcomes.

2.5. Governance and administration

Governance and administration in sports organizations are critical determinants of system efficiency and athlete success. Effective governance encompasses dimensions such as strategic planning, resource mobilization, accountability, and transparency, all of which significantly impact performance outcomes (Winand et al., 2010). Countries that have adopted professionalized and transparent governance structures demonstrate stronger alignment between strategic objectives and athletic performance. In contrast, political interference, nepotism, and corruption—frequently observed in developing nations—undermine decision-making, policy execution, and ultimately, athlete development (Henry & Lee, 2004). Strategic planning forms the foundation of successful sports ecosystems, requiring evidence-based policymaking, long-term vision, and implementation monitoring (Houlihan & Green, 2008). However, challenges such as weak inter-agency coordination, funding gaps, and misaligned goals often disrupt policy execution in countries like India. High-performing nations typically implement robust performance evaluation frameworks and ensure accountability among stakeholders to bridge strategy and outcomes (De Bosscher et al., 2006).

From a theoretical standpoint, Systems Theory (von Bertalanffy, 1968) positions governance as the central coordinating subsystem that orchestrates interactions across all other domains—such as infrastructure, training, and competition exposure—ensuring systemic alignment and efficiency. The Resource-Based View (RBV) further conceptualizes governance quality as an intangible yet strategically vital organizational capability, essential for effectively leveraging tangible resources like infrastructure and human capital (Barney, 1991). In the Indian context, despite increased investments and a growing talent pool, governance inefficiencies and inconsistent policy implementation continue to hinder the nation's potential in international sports performance.

Hypothesis 3 (H3): Governance and Administration have a significant positive relationship with Performance Outcomes.

2.6. Socio-cultural environment

Sociocultural factors have a big impact on people's decision to play sports and, as a result, their success in sports. Cultural attitudes and values directly influence how societies perceive sports as a career, with countries that normalize sports as a viable professional pursuit tending to produce a higher number of elite athletes (Coalter, 2007). In India, however, the predominant societal emphasis on academic success often marginalizes athletic aspirations, limiting early engagement and shrinking the talent pool. Gender bias further exacerbates the issue; nations that actively promote gender equity in sports report better performance across multiple disciplines (Pfister, 2010). Media coverage and public support are also essential components of the socio-cultural ecosystem. While the media has the power to mobilize national attention and attract investment, it can also contribute to uneven development by disproportionately highlighting select sports—such as cricket in India—at the expense of others (Rowe, 2004). Moreover, public engagement, fan enthusiasm, and grassroots participation contribute to creating a supportive social environment that enhances athlete motivation and nurtures emerging talent (Green & Houlihan, 2005).

Theoretical frameworks support these observations. Systems Theory (von Bertalanffy, 1968) identifies culture as a contextual subsystem that influences systemic engagement and participation dynamics, shaping how other elements such as governance, training, and competition operate. Meanwhile, the Resource-Based View (Barney, 1991) conceptualizes socio-cultural values and public attitudes as intangible yet critical cultural capital. These factors influence participation patterns, societal investment in sports, and the overall developmental trajectory

of a nation's sporting ecosystem. In India, the combination of societal preference for academics, limited early exposure to sports, and persistent gender disparities continues to pose significant challenges to broad-based talent identification and development.
Hypothesis 4 (H4): Socio-Cultural Environment has a significant positive relationship with Performance Outcomes.

2.7. Economic factors

The economy has a big impact on how well a country does in sports because it affects both the supply and security of systems that help athletes. Sustainable funding models that incorporate diversified sources—public allocations, corporate sponsorship, and philanthropic contributions—have been found to strengthen the resilience and long-term viability of sports systems (De Bosscher et al., 2015). Predictable financial support not only enhances programmatic continuity but also reduces athlete dropout rates by ensuring income stability during training phases (Taylor et al., 2008). Comprehensive support mechanisms, including stipends, scholarships, and post-retirement plans, widen the talent base by minimizing the socioeconomic barriers that often deter sustained athletic engagement. However, the growing reliance on private and corporate sponsorships introduces challenges related to equitable resource distribution. Commercial interests frequently concentrate funding in a few popular sports, exacerbating disparities and limiting the development of less-visible disciplines (Slack & Bentz, 1996). Regulatory frameworks and institutional oversight are therefore essential to ensure that private investments align with broader national sports objectives.
From a theoretical standpoint, the Resource-Based View (RBV) positions financial capital as a vital tangible resource that facilitates the acquisition, development, and retention of other critical assets such as training infrastructure, coaching expertise, and athlete wellness services (Barney, 1991). Additionally, Human Capital Theory underscores the link between economic stability and individual investment in skill development; athletes with assured financial support are more likely to pursue rigorous training without the burden of economic survival (Becker, 1964). In the Indian context, limited financial security and the absence of comprehensive post-career support systems often result in early athlete dropouts and undermine long-term competitiveness (Truyens et al., 2014), highlighting the urgent need for reform in funding practices and economic safeguards within the sports ecosystem.
Hypothesis 5 (H5): Economic Factors and Support Systems have a significant positive relationship with Performance Outcomes.

2.8. Competition exposure

Competition exposure is a critical determinant of athlete development and elite performance, functioning as both a developmental platform and a performance benchmark. Empirical research highlights that athletes who participate in regular, high-quality competitions develop superior psychological resilience, strategic flexibility, and performance consistency (Bloom, 1985; De Bosscher et al., 2006). International exposure, in particular, enhances athletes' adaptability to diverse conditions and competitive environments. However, studies caution against the diminishing returns of frequent but low-caliber events, which may fail to offer meaningful developmental challenges (Reid et al., 2007). A well-structured domestic competition system—featuring tiered leagues and progression pathways from grassroots to elite levels—is essential for cultivating and sustaining talent (Truyens et al., 2014). In India, the inconsistency and fragmented organization of domestic tournaments significantly impede athlete readiness, limit scouting opportunities, and constrain transitions to international stages.
From a conceptual standpoint, the Resource-Based View (RBV) treats competitive experience as a rare and valuable intangible resource that enhances athletes' decision-making and performance under pressure (Barney, 1991). Human Capital Theory reinforces this by emphasizing the role of experiential learning in refining skills, fostering adaptability, and optimizing performance outcomes (Becker, 1964). Furthermore, Systems Theory identifies competition as a critical feedback loop within the broader sports ecosystem, offering real-time performance validation and insights for systemic improvement (von Bertalanffy, 1968). The limited exposure of Indian athletes to high-stakes competitions has thus restricted their psychological preparedness and international competitiveness, indicating a pressing need to revamp both domestic and international exposure frameworks to align with global best practices (Vaeyens et al., 2008).
Hypothesis 6 (H6): Competition Exposure has a significant positive relationship with Performance Outcomes.

2.9. Literature gaps and research opportunities

While the literature on sports performance and governance is rich, several gaps remain evident. First, much of the empirical work is either dated or concentrated in developed contexts. Recent studies (2023–2025) on sports economics and governance highlight issues of financial sustainability, cost–benefit efficiency of mega-event investments, and the role of digitalization in governance reforms (Li et al., 2023; Han & Zou, 2024). However, their integration into national-level athlete performance studies is still limited.
Second, there is a need to strengthen the intersection of financial frameworks and marketing strategies in sports. Emerging scholarship emphasizes the ROI of sponsorships, branding value of athletes, and the efficiency of public–private funding models in driving long-term sports development (Baade & Matheson, 2016; Frias-Aceituno et al., 2019). Yet, few studies explicitly embed these perspectives into performance outcome models, leaving a critical gap for interdisciplinary research that bridges economics, finance, and marketing.
Third, the Indian context remains underexplored. Existing literature heavily references Western and BRICS governance models, but India-specific scholarship on grassroots financing, sponsorship efficiency, and PPP-driven sports economics is sparse. Cultural studies note barriers such as the dominance of cricket (Majumdar, 2004), societal emphasis on academics (Gupta, 2011), and gender bias in participation (Bandyopadhyay, 2019), yet quantitative integration of these socio-cultural realities with economic and financial models is minimal.
Addressing these gaps requires updated, interdisciplinary, and locally grounded research that integrates governance, finance, and marketing into the Indian sports ecosystem. Such work would not only ensure greater contextual relevance but also enhance the practical utility of research for policymakers, sponsors, and athlete development programs.
Quantitative assessment of factor interrelationships remains scarce, as does longitudinal analysis tracking the long-term effects of specific interventions. Lastly, cultural specificity is often under-explored, despite its significant influence on policy effectiveness and athlete behavior (Coalter, 2007).
Getting these gaps filled through cross-disciplinary, culturally sensitive, and continuous research methods can make future studies on sports performance much more useful and have a bigger effect on people's performance. Figure 1 shows the suggested theory model that was based on a study of the literature.

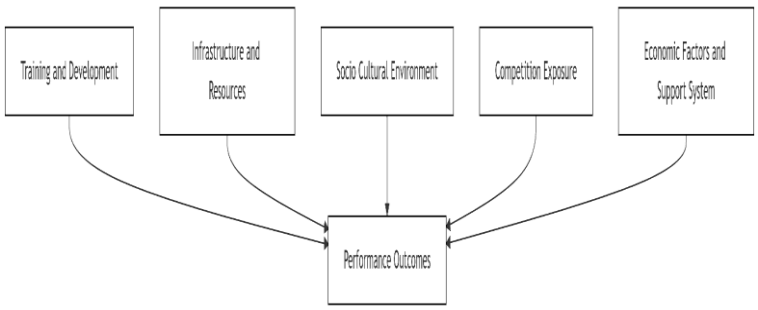


Fig. 1: The Proposed Theoretical Model.

3. Research Methodology

A quantitative method was used in this study to look at how different factors affect the results of sports success. We wanted to find out how things like training and development systems, infrastructure and resources, governance and administration, sociocultural environment, economic factors, and competition exposure affect sports performance, especially when it comes to public-private partnerships in India.

A method called "non-probability convenience sampling" was used. This study used the "10 times rule" from Hair et al. (2017/2019) to figure out the sample size. This rule says that the sample size should be at least ten times the largest number of formative indicators. There were 303 people in the group for this study. Athletes, teachers and trainers, people who run sports organizations, and sports fans were all in the target group.

An organized form was used to get the study data. The poll had closed-ended questions, and the answers were rated on a five-point Likert scale that went from "strongly disagree" to "strongly agree." Structural Equation Modeling (SEM) and the Partial Least Squares (PLS) method with Smart PLS software were mostly used for the data analysis. This method lets you look at many complex links between hidden variables at the same time.

All of the study's categories show acceptable levels of reliability and validity. Cronbach's Alpha and Composite Reliability (ρ_c) tests show that the reliability is high; all models scored above the 0.7 level, which means they are strongly consistent with each other.

It is normal for the outer loadings of all markers on their own structures to be above 0.6, and many of them are above 0.7. This means that the markers are good ways to measure the things they are based on. The loading speeds for things like PO3 (0.883), TD4 (0.887), and SC4 (0.889) are very fast.

The VIF data for collinearity showed that there were no multicollinearity problems because all of the VIF numbers were below the important level of 5. Some items, mostly in the "Performance Outcomes" and "Socio-Cultural Environment" constructs, get close to having higher VIF values (for example, PO5 = 3.118 and SC4 = 3.682), but they are still within acceptable ranges.

Some indicators (e.g., CE3 = 0.675, EF3 = 0.659, EF4 = 0.625) are slightly below 0.708. However, the composite reliability for those constructs is still strong (e.g., CE = 0.872, EFSS = 0.834), and AVE values are also above 0.5.

This suggests that the model as a whole maintains good convergent validity, even with a few weaker indicators. While having a few outer loadings below 0.708 is not ideal, it does not significantly harm the model's reliability and validity if the overall construct-level metrics (CR and AVE) are acceptable. Therefore, the model remains methodologically sound and interpretable. In addition to performance outcomes, the model's findings are interpreted using economic frameworks such as opportunity cost, ROI of training investments, and allocative efficiency in governance systems.

4. Analysis and Findings

Table 1: Reliability and Convergent Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Competition Exposure	0.817	0.846	0.872	0.578
Economic Factors and Support System	0.791	0.871	0.834	0.503
Governance and Administration	0.840	0.849	0.881	0.552
Infrastructure and Resources	0.838	0.848	0.881	0.554
Performance Outcomes	0.895	0.900	0.923	0.705
Socio-Cultural Environment	0.924	0.925	0.939	0.689
Training and Development	0.896	0.917	0.923	0.706

In order to assess the measurement model, both reliability and convergent validity were calculated according to Cronbach's alpha, composite reliability (rho_A and rho_C), and Average Variance Extracted (AVE). All seven constructs of the model, Competition Exposure, Economic Factors and Support System, Governance and Administration, Infrastructure and Resources, Performance Outcomes, Socio-Cultural Environment, and Training and Development, exhibited sufficient internal consistency. Specifically, the Cronbach's alpha scores of all constructs exceeded the recommended cut-off score of 0.70 suggested by Hair et al. (2019), indicating adequate reliability. The highest Cronbach's alpha was recorded for Socio-Cultural Environment (0.924), while the lowest Cronbach's alpha was acceptable (0.791) for Economic Factors and Support System.

Both rho_A and rho_C were used to measure composite reliability. These are two reliability factors that are thought to be more reliable in PLS-SEM (Dijkstra & Henseler, 2015). All of the recorded combined dependability values for each construct were above 0.80, which supports the idea that the internal consistency was very good. For instance, Training and Development and Performance Outcomes both had rho_C values of 0.923, which means they were very reliable as constructs.

Regarding convergent validity, the Average Variance Extracted (AVE) for each construct was above the minimum level set at 0.50 (Fornell & Larcker, 1981), confirming that each construct explained over half of the variance in its indicators. The construct Training and Development had the highest AVE (0.706), and the Economic Factors and Support System had the lowest AVE (0.503), which was acceptable

but still the lowest. All of these results support the idea that the measurement model has good psychometric qualities. This gives us a solid base for figuring out how the different theories are related in the next study.

Table 2: Discriminant Validity [Fornell-Larcker Criterion]

	Competition Exposure	Economic Factors and Support System	Governance and Administration	Infrastructure and Resources	Performance Outcomes	Socio-Cultural Environment	Training and Development
Competition Exposure	0.761						
Economic Factors and Support System	0.565	0.709					
Governance and Administration	0.595	0.406	0.743				
Infrastructure and Resources	0.637	0.519	0.696	0.744			
Performance Outcomes	0.681	0.517	0.648	0.672	0.840		
Socio-Cultural Environment	0.603	0.586	0.636	0.673	0.772	0.830	
Training and Development	0.428	0.244	0.602	0.535	0.547	0.474	0.840

To assess discriminant validity among the latent constructs, the Fornell-Larcker criterion was applied. According to Fornell and Larcker (1981), discriminant validity is established when the square root of the Average Variance Extracted (AVE) for each construct (represented along the diagonal of the matrix) is greater than the correlation values between that construct and any other construct (represented off-diagonal). In the present study, all constructs satisfied this criterion, confirming that each construct is empirically distinct from the others. For example, the square root of AVE for Performance Outcomes is 0.840, showing excellent discriminant validity, greater than its correlations with Infrastructure and Resources (0.672), Governance and Administration (0.648), and Competition Exposure (0.681). Comparably, the square root of AVE for the socio-cultural environment is 0.830, higher than its connection with other dimensions like governance and administration (0.636) and infrastructure and resources (0.673). With a square root of AVE of 0.840, the concept Training and Development also exhibits discriminant validity, outperforming its correlations with Performance Outcomes (0.547) and Governance and Administration (0.602).

These findings, therefore, bolster the assertion that the constructs included in the model are unique and capture discrete conceptual domains. Testing for discriminant validity is important, especially in complex structural equation modeling studies, because it ensures that connections observed among constructs are not spurious due to construct overlap (Hair et al., 2019).

Table 3: Discriminant Validity [Heterotrait Monotrait Ratio]

	Competition Exposure	Economic Factors and Support System	Governance and Administration	Infrastructure and Resources	Performance Outcomes	Socio-Cultural Environment
Competition Exposure						
Economic Factors and Support System	0.587					
Governance and Administration	0.690	0.392				
Infrastructure and Resources	0.761	0.537	0.812			
Performance Outcomes	0.774	0.483	0.712	0.766		
Socio-Cultural Environment	0.667	0.547	0.680	0.762	0.843	
Training and Development	0.482	0.200	0.688	0.590	0.590	0.499

The Heterotrait-Monotrait (HTMT) relationship was looked at to get a better idea of discriminant validity. Based on what Henseler, Ringle, and Sarstedt (2015) say, discriminant validity is good when HTMT values are less than either the cautious 0.85 threshold or the liberal 0.90 threshold. Most of the HTMT values in this study are below the 0.85 level, which means the categories are empirically different and discriminant validity is met.

For example, the HTMT value between Socio-Cultural Environment and Performance Outcomes is 0.843, which is acceptable under the 0.85 cut-off but extremely near the threshold. Likewise, there is an appropriate degree of discriminant validity shown by the HTMT score of 0.812 between Governance and Administration and Infrastructure and Resources. Other construct combinations with HTMT scores significantly below 0.85 are Competition Exposure and Economic Factors and Support System (0.587) and Performance Outcomes and Training and Development (0.590).

However, special attention may be warranted for pairs like Performance Outcomes and Socio-Cultural Environment (0.843), and Infrastructure and Resources and Socio-Cultural Environment (0.762), as these are relatively higher and nearing the threshold. Nonetheless, since none of the HTMT values exceed 0.85, it can be concluded that the model demonstrates satisfactory discriminant validity using the HTMT criterion.

Table 4: Coefficient of Determination

	R-square	R-square adjusted
Performance Outcomes	0.699	0.693

The R^2 value for the endogenous construct Performance Outcomes was 0.699, which means that the following exogenous variables explain about 69.9% of the variation in performance outcomes: Competition Exposure, Economic Factors and Support System, Governance and Administration, Infrastructure and Resources, Socio-Cultural Environment, and Training and Development. The number of variables in the model was taken into account, and the modified R^2 value was 0.693. Hair et al. (2019) say that in behavioral and social science studies, an R^2 number above 0.67 is significant. We can see from these results that the model does a good job of explaining things and that the chosen structures help us understand why sports success outcomes vary in India, where public and private partnerships exist.

Table 5: Effect Size

	Performance Outcomes
Competition Exposure	0.102
Economic Factors and Support System	0.045
Governance and Administration	0.051
Infrastructure and Resources	0.049

Performance Outcomes	
Socio-Cultural Environment	0.280
Training and Development	0.038

Cohen's f² effect size was used to figure out how much each of the external constructs affected the total variation in the internal construct Performance Outcomes. Cohen suggested in 1988 that f² values of 0.02, 0.15, and 0.35 show small, medium, and large effects, respectively. The Socio-Cultural Environment had the biggest impact on performance outcomes in this study. It had an f² value of 0.280, which means it had a medium-to-large effect size. This shows how important cultural attitudes, community support, and societal norms are in determining athletic success. Competition Exposure had an f² of 0.102, suggesting a small-to-moderate effect, and showing that opportunities for athletes to compete significantly enhance performance outcomes.

Other constructs, such as Governance and Administration ($f^2 = 0.051$), Infrastructure and Resources ($f^2 = 0.049$), and Economic Factors and Support System ($f^2 = 0.045$), demonstrated small effect sizes, indicating they contribute modestly to explaining performance but are still relevant. Training and Development had the smallest effect size among the significant predictors ($f^2 = 0.038$), suggesting that while training programs are important, their direct impact on performance may be less pronounced than socio-cultural or competitive exposure factors in this model.

Table 6: Predictive Relevance

	Q² predict
PO1	0.497
PO2	0.337
PO3	0.470
PO4	0.479
PO5	0.585

To assess the predictive relevance of the structural model, the Q² (Stone-Geisser's Q²) values were assessed using the PLS Predict approach. As established by Geisser (1974) and Stone (1974), Q² values greater than zero suggest the model has predictive relevance for a particular endogenous indicator. In the current study, all five indicators of Performance Outcomes (PO1 to PO5) yielded positive Q² values, supporting the model's ability to predict out-of-sample observations.

In fact, the Q² coefficients for PO1 (0.497), PO2 (0.470), PO3 (0.479), and PO5 (0.585) are particularly high, indicating strong predictive relevance, especially for PO5. PO2 is still acceptable with a Q² of 0.337, which is still illustrative of a sufficient level of prediction. Q² values of 0.02, 0.15, and 0.35 may be classified as having small, medium, and large predictive relevance (Hair et al., 2019). So, the findings from this model demonstrate reasonably high predictive accuracy for all the indicators of performance outcomes, further supporting the model's practical value as a means to assess the effectiveness of public-private partnerships in the development of sports infrastructure in India. The results can be seen in Figure 2.

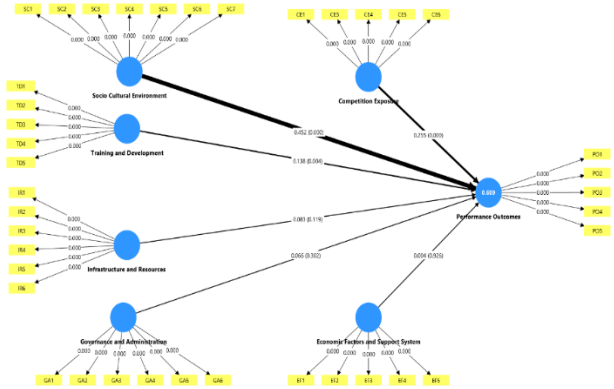


Fig. 2: Empirical Model (PLS Bootstrap).

Table 7: Path Coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Competition Exposure -> Performance Outcomes	0.255	0.253	0.050	5.050	0.000
Economic Factors and Support System -> Performance Outcomes	0.004	0.008	0.047	0.092	0.926
Governance and Administration -> Performance Outcomes	0.066	0.065	0.064	1.032	0.302
Infrastructure and Resources -> Performance Outcomes	0.083	0.086	0.054	1.559	0.119
Socio-Cultural Environment -> Performance Outcomes	0.452	0.450	0.060	7.492	0.000
Training and Development -> Performance Outcomes	0.138	0.139	0.048	2.855	0.004

The structure model was tested to see how the hidden categories were thought to be related to the dependent variable, Performance Outcomes. Path factors, t-statistics, and p-values were used to figure out how important these connections were. The results show that the sociocultural environment has the biggest and strongest effect on performance outcomes ($\beta = 0.452$, $t = 7.492$, $p < 0.001$). This means that cultural norms, community support, and societal attitudes are very important in making sports programs in India work. It was also found that Competition Exposure ($\beta = 0.255$, $t = 5.050$, $p < 0.001$) and Training and Development ($\beta = 0.138$, $t = 2.855$, $p = 0.004$) were strong factors of performance results. Interestingly, economic factors didn't have a big direct effect on performance results ($^2 = 0.004$, $p = 0.926$). From an economic point of view, this can be explained by the idea of diminishing returns on capital investments: more money won't do

much good if human capital and government efficiency aren't improved at the same time. From a cost–benefit point of view, it's also clear that random or uneven financial inputs—which are often focused on cricket—do not produce equal results across the entire sports environment. Also, when it comes to labor economics, players and families weigh the opportunity costs of playing sports against the high opportunity costs of schooling and secure work. This means that financial rewards have less of an effect on the overall situation. These results suggest that economic support systems are needed, but they should not directly affect performance. Instead, they should work with training, exposure, and changes to the way things are run in order to make sports investments more efficient and give better returns. Based on these data, it seems that better sports success is caused by having more access to competition platforms and well-structured athletic development programs.

On the other hand, constructs such as Infrastructure and Resources ($\beta = 0.083$, $t = 1.559$, $p = 0.119$), Governance and Administration ($\beta = 0.066$, $t = 1.032$, $p = 0.302$), and Economic Factors and Support System ($\beta = 0.004$, $t = 0.092$, $p = 0.926$) did not exhibit statistically significant relationships with performance outcomes. These findings may imply that while governance frameworks and financial support are important enablers, their direct impact on performance is limited unless mediated by more immediate experiential and developmental factors like training and competitive exposure.

The results underscore the critical role of socio-cultural and training environments in enhancing athletic outcomes, while suggesting that infrastructural and administrative elements may exert more indirect or long-term influence. These insights have implications for policy-makers and stakeholders in public-private partnerships aiming to strengthen sports infrastructure in India.

5. Discussion and implications

The findings can be situated within broader economic theory. The dominance of socio-cultural factors suggests the presence of non-monetary externalities—social norms, academic pressures, and gender bias—that distort the efficient allocation of labor into sports. From a labor economics perspective, Indian athletes face high opportunity costs of pursuing sports relative to stable career paths, which weakens the effectiveness of financial subsidies unless cultural perceptions shift. The most influential factor identified was the socio-cultural environment, which had the strongest and most significant impact on performance outcomes. The strong role of socio-cultural environment must also be understood in the uniquely Indian context. Cultural studies highlight the dominance of cricket as a "national obsession", which skews media coverage, corporate sponsorship, and even parental encouragement toward a single sport (Majumdar, 2004). At the same time, the entrenched emphasis on academic achievement—especially in middle-class households—creates structural disincentives for pursuing sports as a viable career (Gupta, 2011). Gender bias remains another critical barrier, with studies noting limited family and community support for female athletes in rural and semi-urban regions (Bandyopadhyay, 2019). These qualitative insights reinforce the quantitative finding that socio-cultural norms exert the most powerful effect on performance outcomes, suggesting that economic or infrastructural reforms alone may remain insufficient unless accompanied by a shift in societal values. This suggests that any effort to improve sports performance must align with societal values, norms, and community support mechanisms. Managers and policymakers should therefore focus on building a positive sports culture, promoting grassroots participation, and leveraging media and social influencers to shift societal attitudes in favor of athletic pursuits.

Competition exposure also emerged as a key predictor of performance outcomes, highlighting the importance of organizing regular local, regional, and national-level tournaments and providing athletes with access to high-quality competitive experiences. Managers of PPP-led projects should ensure that the infrastructure being developed is not merely physical but includes platforms for talent identification and performance benchmarking.

Although training and development had a relatively smaller effect size, it was statistically significant. This indicates that structured coaching programs, sports science support, and athlete mentorship must be integral components of sports development initiatives. PPP managers should partner with professional training academies and leverage technology to provide data-driven and individualized training plans.

Interestingly, factors such as infrastructure and resources, governance and administration, and economic support systems did not show significant direct effects on performance outcomes. This implies that while these factors are essential enablers, they must be strategically aligned with soft components such as culture, exposure, and training to be effective. The statistically insignificant role of economic factors ($\beta = 0.004$, $p = 0.926$) can be interpreted through cost–benefit analysis and diminishing returns to capital: without complementary human capital and governance efficiency, additional funding yields limited outcomes. From a labor economics lens, households evaluate sports against the high opportunity cost of education and secure employment, weakening the marginal impact of financial subsidies. Moreover, sporadic or uneven financial flows—often concentrated in cricket—reflect a misallocation of resources, lowering ROI across the broader sports ecosystem. Thus, economic inputs may function more as enabling conditions than as direct drivers of performance unless carefully targeted. Funding diversification models—combining government grants, corporate sponsorship, charitable gifts, and community-based financing—can mitigate uncertainty around funding and decrease the reliance on a singular funding stream. Policymakers can also incorporate cost-effectiveness analyses of different funding streams to optimize the resource allocation geared towards maximizing returns on athlete development.

Likewise, the lack of importance of governance and infrastructure underscores inefficiencies that may be interpreted as transaction costs and/or principal–agent problems related to sport administration. Infrastructure investments do not result in pro-rata returns unless coupled with quality training and competitive access - this is the classic example of unaligned embedded incentives. Thus, governance reforms that enhance efficiency, such as transparent distribution of subsidies, performance-based funding approaches, and a stronger approach to management of PPP contracts, are required to improve ROI on public and private spending in the industry. Operationalizing governance reforms in India will require transparent mechanisms for accountability, including independent auditing of sports federations, performance-linked budgeting, and transparency models that use similar frameworks to corporate governance codes. In doing so, political interference will be reduced while stakeholder incentives will be aligned.

In addition to the primary findings, we can consider how sports performance could be understood through other interdisciplinary lenses. For instance, we noted a marketing-finance connection in the role of media promotion and sponsorship decisions that are biased in disbursing financial resources to cricket (more than other sports). This creates market inefficiencies and inequities that compromise balanced sport development. Sponsorship and broadcast revenue decision-making that is based on ROI may become useful in ensuring that resources are deployed toward sustainable athlete development. Furthermore, with our other findings, it also highlights some implicit ESG dimensions - fair distribution of monetary resources across gender and regional bias; managing governance processes to limit political interference so as to endorse athlete participation; and promotion of social investment to support community participation in sport. In particular, the use of PPPs can enhance rural–urban equity by stimulating private investment in community sports facilities in areas disadvantaged by insufficient infrastructure, and through the provision of targeted subsidies and scholarship programs to mitigate gender gaps in access to training and competitive exposure. Including these initiatives in a formal cost–benefit framework can ensure that equity objectives are met alongside efficiency. Embedding sports in ESG frameworks will drive not only economic efficiency but also a sense of legitimacy and sustainability in the sector.

Therefore, it would be necessary for managers to make an integrated approach that blends physical infrastructure with intangible developmental inputs to realize the full potential of PPPs within the sports industry. Moreover, the great explanatory power ($R^2 = 0.699$) and strong predictive relevance (Q^2 values higher than 0.33 across measures) of the model add rigor to the findings for practice. Stakeholders in the public and private sectors within the sports industry will need to go beyond financing infrastructure and instead will have to focus on developing the ecosystem as a whole to promote inclusive and sustainable sports development in India. Also, if we position these ideas on economic, financial and interdisciplinary lenses, we can determine where we need to move towards allocative efficiency, aligning of incentives, measurable ROI, equity for girls and women, rural-urban equity, line of sight for operated governance reform, and ESG (environmental, societal, and governance) into India's wider development story for sport..

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