

COMPARATIVE ANALYSIS OF THE SPORTS-PEDAGOGICAL TRAINING SYSTEM FOR ATHLETES IN CHONGQING AND BISHKEK: USING THE EXAMPLE OF TENNIS

ANÁLISE COMPARATIVA DO SISTEMA DE FORMAÇÃO ESPORTIVO-PEDAGÓGICA PARA ATLETAS EM CHONGQING E BISHKEK: O CASO DO TÊNIS

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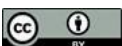
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Abstract

This study presents a comparative analysis of the sports-pedagogical training systems for tennis athletes in Chongqing (People's Republic of China) and Bishkek (Kyrgyz Republic), conceptualizing the city as a meso-level unit of athlete development. Guided by a framework linking city-level systemic inputs to sports-pedagogical training processes and athlete development outcomes, the study adopts a qualitative comparative case study design based on document analysis. The findings indicate that Chongqing operates within a state-coordinated and vertically integrated training system characterized by dense development pathways, standardized coaching practices, and structured monitoring mechanisms. In contrast, Bishkek relies on a more decentralized, federation- and club-based system marked by greater variability in training processes, lower competition density,

Resumo

Este estudo apresenta uma análise comparativa dos sistemas de treinamento esportivo-pedagógico para atletas de tênis em Chongqing (República Popular da China) e Bishkek (República do Quirguistão), conceituando a cidade como uma unidade de nível meso no desenvolvimento de atletas. Guiado por um quadro que vincula os insumos sistêmicos em nível municipal aos processos de treinamento esportivo-pedagógico e aos resultados do desenvolvimento dos atletas, o estudo adota um desenho de estudo de caso comparativo qualitativo baseado na análise de documentos. Os resultados indicam que Chongqing opera dentro de um sistema de treinamento coordenado pelo Estado e verticalmente integrado, caracterizado por trajetórias de desenvolvimento densas, práticas de treinamento padronizadas e mecanismos de



and limited institutional support. The comparison demonstrates that differences in governance arrangements and resource environments are closely associated with the coherence and sustainability of athlete development pathways. By focusing on the city as the unit of analysis and tennis as a representative sport, this study contributes to comparative sport pedagogy and provides empirical insights into how training systems function under contrasting institutional conditions.

Keywords: Sports Pedagogy. Tennis. Athlete Development Pathways. Comparative Case Study. City-Level Analysis.

monitoramento estruturados. Em contraste, Bishkek depende de um sistema mais descentralizado, baseado em federações e clubes, marcado por maior variabilidade nos processos de treinamento, menor densidade de competições e apoio institucional limitado. A comparação demonstra que as diferenças nos arranjos de governança e nos ambientes de recursos estão intimamente associadas à coerência e à sustentabilidade das trajetórias de desenvolvimento dos atletas. Ao focar na cidade como unidade de análise e no tênis como esporte representativo, este estudo contribui para a pedagogia esportiva comparativa e fornece insights empíricos sobre como os sistemas de treinamento funcionam sob condições institucionais contrastantes.

Palavras-chave: *Pedagogia Esportiva. Tênis. Trajetórias de Desenvolvimento de Atletas. Estudo de Caso Comparativo. Análise em Nível Municipal.*

1 INTRODUCTION

Cities increasingly function as “meso-systems” for athlete development: they aggregate facilities, coaches, schools, clubs, competitions, and governance capacity into a coherent (or fragmented) pathway. Tennis is a useful lens because it requires long-horizon skill acquisition, progressive competition exposure, and specialized coaching. therefore, system design (not only individual talent) strongly conditions outcomes. From a sports-pedagogical perspective, athlete development is not merely a biological maturation process but an educational trajectory shaped by institutional arrangements, pedagogical models, and policy priorities (Bailey et al., 2010. De Bosscher et al., 2015).

In China, tennis development has recently been framed as ecosystem construction that expanding participation, building youth academies and clubs, and improving elite conversion what signaling continued state guidance and scaling logic across provinces and so-called “strong tennis cities.” This approach is consistent with China’s broader competitive sports governance model, which emphasizes centralized planning, vertical integration of training pathways, and strong governmental involvement at national, provincial, and municipal levels (Zheng, 2016. Hong, 2011). Within this system, cities

play a critical intermediary role by translating national policy objectives into concrete training structures, such as sports schools, school–club cooperation mechanisms, municipal training bases, and competition hierarchies (Green & Houlihan, 2005).

Recent reforms in China have further emphasized the integration of sports and education, seeking to balance athletic performance with academic development and long-term athlete welfare (Liu & Chen, 2021). While this reform has expanded participation and diversified development pathways, it has also introduced new pedagogical and managerial challenges, including coordination between schools and sports institutions, uneven access to high-quality coaching, and tensions between early specialization and holistic development (Zhang et al., 2020). Tennis, as a late-specialization yet highly technical sport, exemplifies these challenges and thus provides a particularly revealing case for examining the effectiveness of city-level sports-pedagogical systems.

In contrast, Kyrgyzstan represents a post-Soviet sports development context characterized by institutional pluralism, limited public resources, and a greater reliance on sports federations and local clubs. Athlete training systems in Central Asian countries have undergone significant restructuring since the 1990s, shifting from highly centralized Soviet models toward more decentralized and mixed governance arrangements (Riordan, 2007. Houlihan & Zheng, 2013). In Kyrgyzstan, youth athlete development is commonly supported through Olympic reserve schools, municipal sports schools, and national sport federations, with cities such as Bishkek serving as primary hubs for facilities, coaching expertise, and competition opportunities.

However, existing studies indicate that sports development in smaller or resource-constrained systems often faces structural limitations, including narrow talent pools, insufficient competition density, coach shortages, and limited access to sport science and medical support (De Bosscher et al., 2013. Shilbury et al., 2014). These constraints place greater importance on the efficiency and pedagogical coherence of training systems, as suboptimal pathway design can quickly result in athlete dropout or stagnation. In this context, city-level coordination—linking schools, clubs, federations, and competition organizers that becomes a decisive factor in sustaining athlete development.

Despite growing scholarly interest in comparative sport systems and elite sport policy, most existing research focuses on national-level comparisons or Olympic success factors, with relatively limited attention to the city as a functional unit of sports-

pedagogical organization (Green & Houlihan, 2005. De Bosscher et al., 2015). Moreover, comparative analyses between large, state-coordinated systems (such as China) and smaller, transitional systems (such as Kyrgyzstan) remain scarce, particularly at the level of specific sports and training practices. This gap is especially evident in racket sports like tennis, where development outcomes are highly sensitive to coaching quality, competition exposure, and long-term pedagogical planning.

Accordingly, a comparative examination of the sports-pedagogical training systems for tennis athletes in Chongqing and Bishkek offers valuable insights into how differing governance structures, resource endowments, and educational traditions shape athlete development pathways. By focusing on the city level and using tennis as an analytical lens, this study contributes to a more nuanced understanding of how sports pedagogy operates within diverse institutional contexts and how effective training systems can be designed under varying structural constraints.

1.1 Research purpose

To compare the sports-pedagogical training system for tennis athletes in Chongqing and Bishkek across core system dimensions (governance, pathway structure, coaching, training process, competition, and support services), and to derive actionable reform options.

1.2 Research questions

- 1) How do governance and institutional arrangements shape tennis talent pathways in Chongqing vs. Bishkek?
- 2) What are the key differences in pedagogical training processes (periodization, skill progression, evaluation, and coach development)?
- 3) Which system levers (competition ecology, facilities, sport science, school integration) most plausibly explain pathway efficiency and athlete outcomes?

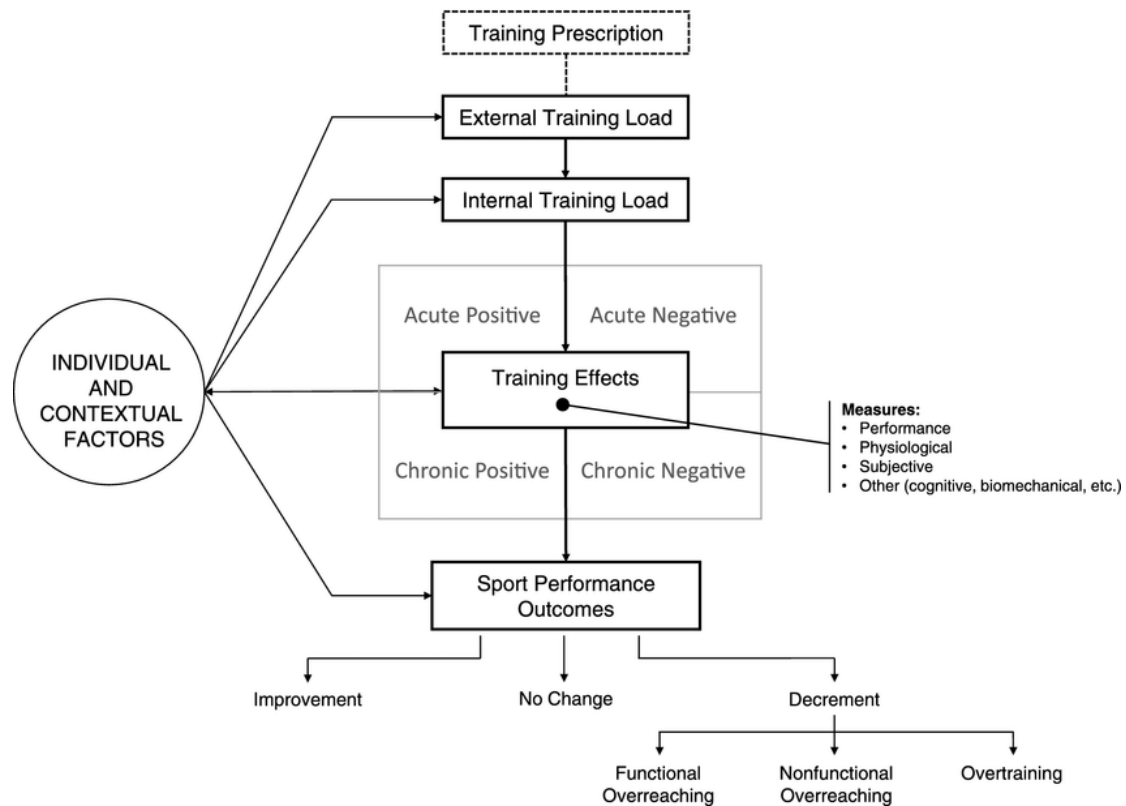
Figure 1*Conceptual Framework*

Figure 1 illustrates the conceptual framework of this study. At the city level, systemic inputs such as governance structures, coaching systems, facilities, and competition opportunities shape sports-pedagogical training processes. These processes mediate the relationship between institutional conditions and athlete development outcomes, including performance progression, retention, and holistic well-being. The framework highlights the moderating role of institutional context and resource availability, enabling a structured comparison between Chongqing and Bishkek.

2 LITERATURE AND CONCEPTUAL BACKGROUND

2.1 Sports-pedagogical training as a system

Sports pedagogy treats training as an educational process: planned progression, feedback, evaluation, and holistic development (technical–tactical–physical–

psychological). For competitive sport, this becomes a structured production system (talent ID → development → competition → transition). China’s sport policy literature highlights strong top-down coordination historically, with evolving integration between sport and education and ongoing reforms to talent pipelines.

2.2 Tennis-specific requirements

Tennis intensifies the importance of (a) early technical literacy, (b) staged competition exposure, (c) individualized periodization, and (d) coach quality. Evidence from China during/after COVID also shows tennis coaching professionalization pressures and increased reliance on mediated/online training modes—relevant to urban systems with uneven facility access.

2.3 Evaluation and indicator logic

Applied work on constructing training evaluation indicators in China emphasizes multi-dimensional evaluation (training inputs, process quality, monitoring, and outcomes), consistent with a “system dashboard” approach used in this paper.

3 METHODOLOGY

3.1 Design

A comparative qualitative case study with structured, indicator-based synthesis:

Case A: Chongqing (PRC) tennis development in a state-coordinated sport environment

Case B: Bishkek (Kyrgyz Republic) tennis development in a smaller, federation/club-anchored environment

3.2 Data sources (document-based)

1. Policy/system descriptions of China’s sport governance and training pathways

2. China tennis ecosystem expansion signal (national-level plan reported publicly)
3. Coaching and training process literature relevant to China tennis practice
4. Bishkek/Kyrgyzstan youth sport coordination and tennis competition signals (federation + city + media reporting)
5. Regional tennis governance signals (ATF listings/minutes. ITF member-association structure)

3.3 Comparative dimensions (coding matrix)

We compare both cities across:

- 1) governance & institutions, 2) pathway structure, 3) coaching development, 4) training pedagogy, 5) competition ecology, 6) facilities/access, 7) sport science & monitoring, 8) education integration & athlete welfare.

4 RESULTS

4.1 Chongqing vs. Bishkek (tennis example)

Table 1

City-Level Comparison of Tennis Training Systems (Sports-Pedagogical)

Dimension	Chongqing (PRC)	Bishkek (Kyrgyz Republic)	Implication
Governance	Strong state coordination within a centralized sport system. current national momentum toward a “tennis ecosystem” and “strong tennis cities.” (Reuters)	More plural governance: federation + city youth-sport institutions. evidence of coordination meetings with youth reserve school directors and state agency support for events. (open.kg)	Chongqing likely has higher pathway coherence. Bishkek depends more on relational coordination and local capacity.
Talent pathway density	Multi-tier pathways typical of China’s sport system (schools/program tiers, promotion logic). (SciSpace)	Smaller athlete base. pathway visibility often via clubs/tournaments and federation selections (e.g., youth participation in international development championships). (Kabar)	Bishkek faces “thin pipeline” risk. Chongqing faces “selection pressure” and balancing sport-education integration.
Coaching development	Professionalization pressures and evolving delivery modes (including online/mediated coaching). (ResearchGate)	Coach capacity development often linked to federation/partner events. regional tennis structures facilitate competition and coach exposure. (Asian Tennis Federation)	Bishkek’s marginal gains may come from certification pipelines and coach community building. Chongqing

Dimension	Chongqing (PRC)	Bishkek (Kyrgyz Republic)	Implication
Training pedagogy	Emphasis on structured training theory and evaluation/indicator thinking in China's competitive sport training discourse. (Frontiers)	Likely more heterogeneous pedagogy across clubs/schools. institutional coordination is developing. (open.kg)	from standardization + sport science integration. Standardized curricula and monitoring can reduce variability and injury risk. Bishkek benefits from shared curriculum templates.
Competition ecology	National strategy stresses tournament economy and broad participation→elite conversion. (Reuters)	Youth tournaments hosted locally (age-group categories) and federation leadership changes may affect competition planning. (open.kg)	Bishkek needs stable annual calendars + travel support. Chongqing needs competition pacing aligned with LTAD and academic load.
Facilities & access	Scale advantage in a major Chinese municipality. policy momentum to expand courts/clubs. (Reuters)	Event hosting at specific club courts indicates reliance on a smaller facility network. (open.kg)	Bishkek: capacity constraints. Chongqing: equity/access and utilization efficiency become key.
Sport science support	Higher likelihood of integration (monitoring, evaluation indices) given China's training evaluation discourse. (Frontiers)	Lower baseline capacity. can leapfrog via portable testing/monitoring and partnerships (academies/universities).	Differentiator for injury prevention and performance stability.
Athlete welfare & education	System reforms emphasize sport–education integration tensions and evolving models. (ResearchGate)	Youth reserve school coordination suggests institutional attention. broader education system constraints remain. (open.kg)	Both need safeguarding, dual-career planning, and retention strategies—implemented via different institutions.

Based on Table 1, several key differences between the tennis training systems in Chongqing and Bishkek can be identified:

1) Governance structure:

Chongqing operates within a state-coordinated and vertically integrated governance system, whereas Bishkek relies on a more decentralized structure dominated by sports federations and clubs.

2) Talent development pathways:

Chongqing demonstrates a dense, multi-tiered athlete development pathway with clearly defined progression stages. In contrast, Bishkek shows a narrower and less formalized pathway, with athlete progression largely dependent on club-based identification and federation selection.

3) Coaching development:

Coaching education and professional development in Chongqing are relatively standardized and institutionalized. Bishkek exhibits greater variability in coaching practices, with fewer formalized development mechanisms.

4) Sports-pedagogical training processes:

Training in Chongqing is characterized by structured long-term planning, standardized curricula, and systematic evaluation. In Bishkek, training processes are more flexible but less standardized and often shaped by short-term competition opportunities.

5) Competition ecology:

Chongqing benefits from a stable, multi-level competition system that supports regular match exposure. Bishkek has fewer competition opportunities, resulting in lower competition density across age groups.

6) Facilities and access:

Chongqing possesses a relatively extensive network of training facilities, while Bishkek relies on a limited number of specialized courts concentrated in urban areas.

7) Sport science and monitoring:

Formal monitoring and evaluation mechanisms are more evident in Chongqing. In Bishkek, sport science support remains limited and less systematically embedded in training.

8) Athlete welfare and education integration:

Chongqing shows greater institutional consideration of academic–sport balance, whereas in Bishkek educational support is less integrated into the training system.

In summary, Table 1 indicates that Chongqing's tennis training system is characterized by high institutional coordination and standardized pedagogical processes, while Bishkek's system reflects greater organizational flexibility but lower structural density.

4.2 Comparison of sports-pedagogical training processes

Table 2

Comparison of Sports-Pedagogical Training Processes in Tennis

Dimension	Chongqing (PRC)	Bishkek (KR)
Training planning	Long-term, system-oriented planning with staged development goals	Short- to medium-term planning, often event-driven
Talent identification	Structured identification through schools and training institutions	Predominantly club-based identification
Coaching practice	Standardized training curricula and instructional guidelines	Greater variability across coaches and clubs
Monitoring and evaluation	Formalized assessment and performance monitoring mechanisms	Limited systematic evaluation tools
Competition scheduling	Integrated with training cycles and development stages	Dependent on available tournaments and federation calendar
Educational support	Institutional consideration of academic–sport balance	Academic support largely external to training system

As shown in Table 2, notable differences are observed in the organization and consistency of sports-pedagogical processes. Chongqing’s system emphasizes standardized training design, structured talent identification, and systematic monitoring, reflecting a strong pedagogical orientation toward long-term athlete development. In Bishkek, training processes appear more heterogeneous and flexible, with greater reliance on individual clubs and coaches, and less formal integration of evaluation and educational support mechanisms.

4.3 Bishkek profile

Federation/club-anchored model with developing public coordination and a smaller athlete pool. Evidence indicates active city-level discussion with youth Olympic reserve school directors about developing youth sport, and tennis events supported by state sport bodies and the national federation. Governance stability and strategic direction can be sensitive to federation leadership transitions, which have been reported recently.

Pedagogical signature (observed via signals):

- 1) strong reliance on club courts for tournament hosting,
- 2) event-based development and selection for international youth opportunities,

- 3) capacity building through regional/international tennis structures (ATF/ITF ecosystem).

Primary risks: thin competition ladder, coach scarcity, limited sport-science support, and financial barriers to travel and equipment.

5 DISCUSSION

5.1 Governance and pathway coherence

Chongqing's comparative advantage is coherence: a city can align schools, training bases, competitions, and coach pipelines under policy targets—especially when national strategy explicitly pushes ecosystem build-out. Bishkek's advantage is flexibility: clubs and the federation can adapt quickly, but coordination costs are higher and capacity is more fragile, making consistent “long ladders” (U10→U18→adult) harder to sustain.

5.2 Coach development as the pivotal constraint

Across both systems, coach quality is the core production function. China's tennis coaching landscape has faced professional instability and adaptation pressures (e.g., mediated coaching growth), implying a need for certification, mentoring, and stable career structures. For Bishkek, the priority is building a *minimum viable coaching ecosystem*: certification routes, shared pedagogy standards, and deliberate coach communities linked to the regional tennis calendar.

5.3 Competition ecology and conversion efficiency

China's emphasis on tournament economy and broad participation is consistent with improving conversion from mass base → elite depth, but it increases the need for age-appropriate competition pacing and academic load management. Bishkek's youth tournaments show vital pathway nodes, but the challenge is density (enough matches of the right quality) and continuity (annual calendars, travel support).

6 CONCLUSION

Chongqing and Bishkek represent two contrasting but increasingly convergent urban athlete-development models. Chongqing's state-coordinated system offers scale and coherence, reinforced by national signals of tennis ecosystem expansion. its main challenge is managing selection pressure, equity, and sport-education integration. Bishkek's federation/club-anchored model shows active youth-sport coordination and growing tournament activity, but faces a thin pipeline and coach/sport-science constraints. its opportunity is to standardize pedagogy, densify competitions, and professionalize coaching through regional/international structures.

7 RECOMMENDATION

7.1 Practical recommendations: for chongqing

- 1) Dual-career protection by design: embed academic coordination into periodization (exam seasons, travel windows) to reduce dropout under sport-education integration pressures.
- 2) Coach professional pathway: city-level coaching ladders (assistant→lead coach→HP coach) with mentoring and stable evaluation aligned to training-quality indicators.
- 3) Equity and utilization: expand access through school-club partnerships and high-utilization community court models consistent with ecosystem expansion goals.

7.2 For Bishkek

- 1) Build a “city tennis pathway map”: formalize progression from clubs → youth reserve schools (where relevant) → federation squads, clarifying selection criteria and annual targets.
- 2) Coach capacity sprint: prioritize ITF/ATF-aligned certification, quarterly coach workshops, and a shared city curriculum template (technical milestones, physical literacy, injury prevention).

- 3) Competition density strategy: lock a 12-month competition calendar (local league + quarterly opens + regional entries), supported by federation sponsorship packages and travel pooling.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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