

CHAPTER I

INTRODUCTION

A. Background of The Problem

Badminton is widely recognized as one of the fastest and most technically demanding racket sports, characterized by intermittent high-intensity actions, rapid accelerations and decelerations, frequent changes of direction, jumping-landing sequences, and repeated overhead strokes performed under strong time pressure. Contemporary sport science therefore no longer treats badminton performance as a purely “skill-based” outcome; instead, it is understood as the integrated expression of technical proficiency, tactical decision-making, physical capacities (speed, power, endurance, agility), and psychological regulation. Recent match and training investigations consistently describe badminton as a mixed metabolic sport that simultaneously challenges anaerobic power for explosive rallies and aerobic capacity for repeated efforts and recovery, while also placing substantial neuromuscular stress on the lower limbs. (Edel et al., 2023; Edel et al., 2024).

In the last decade, technological advances in external-load monitoring (e.g., inertial measurement units, accelerometry-based indicators) and refined internal-load approaches (e.g., session-RPE, heart-rate indices) have expanded the ability of coaches and researchers to quantify badminton demands with greater precision. For example, recent match analyses using inertial sensors have demonstrated that external-load variables can discriminate performance contexts and outcomes, indicating that badminton “work rate” is not only high but also strategically variable across sets, score gaps, and playing styles (Guo et al., 2025). These developments highlight a broader scientific shift: badminton training design is increasingly expected to be evidence-based, load-informed, and developmentally appropriate.

This scientific shift is especially critical for youth athletes. Adolescence is a sensitive period for skill acquisition, neuromuscular development, and long-term performance progression, yet it is also a period of

heightened vulnerability to maladaptive training patterns, including excessive specialization, poorly managed training loads, and insufficient recovery. Over the past decade, consensus-oriented literature has emphasized the necessity of structured monitoring and balanced development models that integrate performance ambitions with athlete health and psychosocial sustainability (Bourdon et al., 2017; Varghese et al., 2021). At the same time, research on youth sport specialization has attempted to clarify definitions and risks, noting that intensive single-sport participation for most of the year can restrict broader athletic engagement and may elevate injury or burnout risk when not carefully managed (Bell et al., 2021; Waldron et al., 2020).

Within badminton, this youth-development challenge becomes even more pronounced because training systems often prioritize early technical refinement and competition exposure. Modern training studies show that badminton-specific drills can impose very high physiological and neuromuscular loads, sometimes exceeding simulated match play depending on drill structure and feeding formats. For instance, comparisons between multi-feeding drills and simulated match play in high-level youth players have shown clear load and intensity differences, suggesting that “technical” sessions may function as major conditioning stimuli and should be periodized and monitored accordingly (Alvarez-Dacal et al., 2025). Similarly, controlled investigations of training-drill interval structures indicate that small changes in interval duration can meaningfully alter load profiles and technical outputs, reinforcing the need for planned training architecture rather than relying on tradition alone (Edel et al., 2023).

In addition to load and conditioning issues, recent evidence continues to support the value of targeted physical training interventions for badminton performance. Meta-analytic work indicates that plyometric training can improve key fitness qualities relevant to badminton (e.g., power, agility, speed, balance), though evidence certainty varies and implementation quality matters (Deng et al., 2024). Complementary reviews of physical training programs in badminton also report positive effects of high-intensity interval-based approaches and strength-

oriented methods on aerobic capacity and agility, again emphasizing the importance of structured planning rather than ad hoc conditioning (Ma et al., 2025).

Against this scientific background, national training environments and development pathways become central to understanding how youth badminton athletes are shaped. China and Indonesia represent two globally influential badminton nations with long-standing elite success and strong participation cultures, yet their youth-development ecosystems differ in historical structure, governance, and institutional logic. In China, youth sport development has been strongly associated with system-level organization and evolving policy frameworks connecting sport and education. The national "integration of sports and education" policy direction—promulgated through joint institutional guidance—emphasizes coordinated development of cultural learning and athletic training, with implications for school-based teams, training pathways, and talent cultivation governance (Ministry of Education of PRC, 2020; General Administration of Sport of China, 2020). At the same time, empirical work on children's sports schools in China suggests that organizational change, resource arrangements, and institutional incentives can shape the everyday reality of youth training environments (Tian et al., 2024).

In Indonesia, youth badminton development is widely characterized by a strong club-based pipeline under the national association framework, with competitive circuits and selection events functioning as key mechanisms for regeneration. Public reporting has described national junior and senior circuits as an important backbone of talent renewal (The Jakarta Post, 2020). Official and governmental communications around national selection also demonstrate formalized entry points into elite environments (e.g., national selection events and selection periods), reflecting how clubs, provincial structures, and national training centers interact in athlete progression (PBSI, 2025; Kemenpora RI, 2025). Research examining club development patterns under PBSI further highlights the significance of local clubs and district/city structures in shaping training delivery and athlete development (Raharjo et al., 2019).

Although both countries aim to produce world-class athletes, the pathway "logic" may differ: China is often discussed through the lens of system

organization and policy-mediated school-sport structures, while Indonesia is frequently discussed through club-based development and selection-competition mechanisms. These differences can influence training volume, periodization emphasis, competition scheduling, coaching specialization, sport-science support, and the balance between education and intensive training. Yet, despite the practical importance of these contrasts, the scientific literature remains limited in direct comparative studies that systematically analyze similarities and differences in youth badminton training between China and Indonesia using a unified framework.

Moreover, contemporary sport governance trends increasingly encourage harmonized, evidence-based athlete development and safeguarding. The Badminton World Federation (BWF) strategic planning direction for 2024-2028 underscores broad developmental priorities and system strengthening, implying that national systems benefit from reflective evaluation and alignment with modern development principles (BWF, 2024-2028). In this context, a structured comparison between China and Indonesia is not merely descriptive; it can provide actionable insights for coach education, training design, talent development efficiency, and athlete health protection.

Therefore, given (1) the evolving sport-science understanding of badminton demands and training load, (2) the sensitivity and importance of youth development stages, and (3) the distinct institutional and cultural environments of China and Indonesia, there is a clear need for systematic research that examines the similarities and differences in youth badminton training between the two countries. This rationale forms the foundation of the present study.

B. Research Focus

Based on the theoretical considerations and practical realities outlined in the background of the study, the present research focuses on a comparative examination of youth badminton training in China and Indonesia. Specifically, this study concentrates on identifying both convergent and divergent features across the two national contexts in terms of development pathways, training content, and training management.

The primary focus of this research is to compare how youth badminton athletes are trained and developed in China and Indonesia, including: (a) the structure of athlete pathways (school-based, club-based, regional-to-national transitions), (b) the composition of training (technical, tactical, physical conditioning, psychological preparation), and (c) training organization (periodization, weekly volume, competition integration, and load monitoring practices). This focus is informed by contemporary evidence that training drills and session structures can substantially alter load and performance outcomes in youth badminton (Edel et al., 2023; Alvarez-Dacal et al., 2025).

Furthermore, the research emphasizes how institutional systems and policy environments may shape youth development and training implementation. In China, policy directions emphasizing the integration of sports and education can influence training arrangements and governance (Ministry of Education of PRC, 2020). In Indonesia, club-based development under PBSI and selection-competition mechanisms constitute central organizational features (PBSI, 2025; Raharjo et al., 2019).

Ultimately, this research is focused on generating a structured, evidence-informed comparative understanding of youth badminton training across China and Indonesia, with the aim of supporting better training design, talent development efficiency, and athlete welfare.

Based on the above, the research focus is summarized as follows:

1. To identify and compare the key components of youth badminton training content in China and Indonesia (technical, tactical, physical, and psychological training).
2. To analyze similarities and differences in training organization and management (periodization, competition integration, and load monitoring) in both countries.
3. To examine how development pathways and institutional contexts (policy-linked school-sport structures in China and club-based PBSI structures in Indonesia) may shape training practices.

C. Problem Formulation

Based on the background of the problem and the defined research focus, this study formulates the research problems as follows:

1. What are the main similarities and differences in youth badminton training content between China and Indonesia?

This problem formulation examines how the two countries differ or align in technical-tactical training emphasis, physical conditioning approaches, and psychological preparation for youth athletes.

2. How do China and Indonesia differ in the organization and management of youth badminton training?

This problem formulation investigates differences in training periodization, weekly structure, competition scheduling, and training-load monitoring practices, considering evidence that training design can produce distinct load and adaptation outcomes (Bourdon et al., 2017; Alvarez-Dacal et al., 2025).

3. How do institutional development pathway shape youth badminton training practices in China and Indonesia?

This problem formulation explores how China's evolving sport-education integration policies and sports-school environments compare with Indonesia's club-based PBSI pipeline and selection mechanisms (Ministry of Education of PRC, 2020; PBSI, 2025).

D. Research purposes

Based on the formulation of the research problems, the purposes of this study are as follows

1. To describe and compare youth badminton training content in China and Indonesia across technical, tactical, physical, and psychological domains, grounded in the modern understanding of badminton performance demands (Edel et al., 2024; Ma et al., 2025).
2. To analyze and compare training organization and management in the two countries, including periodization patterns, competition integration, and load monitoring considerations, consistent with contemporary load-monitoring frameworks (Bourdon et al., 2017).

3. To interpret the influence of development pathways and institutional contexts on youth training implementation in China and Indonesia, using policy and system features as key explanatory dimensions (Ministry of Education of PRC, 2020; Raharjo et al., 2019)

E. State of the Art

Over the past decade, badminton research has expanded rapidly from descriptive match statistics toward integrated models of performance demands, training load, and athlete development. Contemporary studies describe badminton as a high-intensity intermittent sport requiring repeated explosive movement patterns, significant lower-limb loading, and complex stroke-movement coordination (Edel et al., 2024). Recent systematic reviews further suggest that match-play variables differ meaningfully across playing categories and contexts, reinforcing the need to align training models with competitive realities (Winata et al., 2025).

A second major research direction concerns training-load quantification and drill design. With increasing use of wearable devices and standardized monitoring concepts, load is now frequently examined as both an optimization tool and a risk-management tool. Sensor-based studies illustrate how external load can be profiled in competition settings (Guo et al., 2025), while drill-based research demonstrates that technical feeding formats and interval configurations can generate distinct physiological and neuromuscular stimuli (Edel et al., 2023). Comparative work in elite junior players also indicates that certain training methods (e.g., multi-feeding) may impose higher loads than simulated matches, which has direct implications for periodization and recovery planning (Alvarez-Dacal et al., 2025).

A third strand focuses on physical training interventions that transfer to badminton performance. Recent meta-analytic evidence supports plyometric training benefits for power, agility, speed, and balance in badminton players, though methodological quality and evidence certainty remain important considerations (Deng et al., 2024). Broader reviews of physical training programs in badminton also highlight positive effects of interval-based conditioning and strength-oriented approaches on aerobic fitness and agility (Ma et al., 2025).

A fourth strand addresses youth athlete development, specialization, and safeguarding. In the last decade, consensus-based work has clarified monitoring principles and emphasized integrating internal and external load measures into applied settings (Bourdon et al., 2017). Youth development reviews also highlight that successful pathways are multidimensional, involving physical, psychological, and environmental components (Varghese et al., 2021). In parallel, specialization research has offered consensus definitions and critical evaluations of early specialization's costs and benefits (Bell et al., 2021; Waldron et al., 2020). These findings are highly relevant to badminton, a sport where early technical investment is common and must be balanced with long-term health and sustainability.

Despite these advances, research directly comparing national youth badminton training systems remains limited. Existing scholarship often concentrates on (a) performance and physiological demands, (b) intervention effects, or (c) athlete experiences within a single national or club context. For China, research and policy discussions emphasize evolving governance and sport-education integration directions (Ministry of Education of PRC, 2020), and empirical work points to organizational realities within youth sports schools (Tian et al., 2024). For Indonesia, available research highlights the importance of clubs under PBSI and competition-selection mechanisms, supported by studies on club development patterns and public reporting on national circuits and selection events (Raharjo et al., 2019; The Jakarta Post, 2020; PBSI, 2025). However, these bodies of work are rarely integrated into a single comparative framework focused on youth training content and training management.

Accordingly, the present study advances the state of the art by adopting a cross-national comparative perspective on youth badminton training in China and Indonesia. By systematically examining training similarities and differences across two leading badminton contexts—while incorporating modern sport-science principles related to load, development, and performance demands—this research aims to generate practical and theoretical insights that are not adequately provided by single-context studies. This contribution aligns with broader sport development priorities emphasized in international strategic planning (BWF, 2024-2028).