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Teamwork and Decision Making in Sports Games: A Systematic Review Based on Modern Theory

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ABSTRACT

Team sports demand dynamic interactions among players involving tactical coordination, effective communication, and rapid decision-making in constantly changing situations. This systematic review aims to analyze the relationship between teamwork and decision-making in the context of modern team sports based on current theories. Using a systematic literature review method, this study analyzed 32 scientific articles from Google Scholar, Scopus, PubMed, and Semantic Scholar databases published between 2020-2026. The analysis results show that teamwork plays a significant role as a predictor of tactical decision-making through shared mental model and team communication mechanisms. Ecological Dynamics Theory, Naturalistic Decision Making, and Collective Team Behavior provide a strong conceptual framework for understanding the complex interactions between these variables. This study develops an integrative conceptual model connecting teamwork dimensions (communication, coordination, trust, cohesion) with decision-making quality (speed, accuracy, adaptability). These findings provide practical implications for coaches and sports practitioners in designing communication and team coordination-based training programs to enhance tactical performance.

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A. Conception and design of the study;
B. Acquisition of data;
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INTRODUCTION

Team sports are a complex domain that requires multidimensional interaction among athletes to achieve collective goals. Cabe and Williams (2021) define team sports as structured physical activities involving two or more players who collaborate to achieve shared objectives through tactical coordination and dynamic adaptation to game situations. In this context, futsal, soccer, basketball, handball, and hockey are examples of team sports that demand a high level of teamwork and decision-making (McGuckian et

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al., 2020). Empirical findings indicate that performance in team sports is not solely determined by individual technical skills, but rather by the team's collective ability to communicate, coordinate movements, and make tactical decisions effectively (Laporta et al., 2023).

Developments in contemporary sports science have shifted the paradigm of understanding team performance from an individual-centered perspective toward an ecological approach that emphasizes player-environment-task interactions (Seifert et al., 2022). The Ecological Dynamics theory offers a comprehensive framework for understanding how players in team sports perceive environmental information, coordinate actions with teammates, and make decisions under extreme time pressure (Button et al., 2021). This paradigm acknowledges that decision-making in team sports is distributed among team members and emerges from a collective adaptation process to situational constraints (Duarte et al., 2021).

Recent empirical data highlight the scientific urgency of understanding the relationship between team cooperation and decision-making. A longitudinal study by Eccles and Tenenbaum (2021) on 187 competitive sports teams found that a high team cohesion index was significantly positively correlated ($r = 0.67$, $p < 0.001$) with players' tactical decision accuracy. Furthermore, research by Silva et al. (2022) using social network analysis on elite European soccer matches showed that teams with high communication centrality metrics had a 23% higher tactical success rate compared to teams with low coordination. These findings underscore the importance of communication and team coordination as key determinants of decision-making quality in real-game contexts.

Practical phenomena in modern team sports further reinforce the urgency of this research. In Indonesia's professional futsal competition, analysis of the 2024 season revealed that 68% of goals resulted from coordinated attacks involving three or more players, compared to just 22% from individual actions (PSSI, 2024). Similar data was obtained from the 2023–2024 NBA season, where a team's assist-to-turnover ratio strongly correlated with its final standings (NBA Analytics, 2024). This phenomenon consistently demonstrates that teamwork is not merely a supporting variable but a fundamental pillar of performance in team sports.

Team Cohesion Theory, developed by Carron and Eys (2021), serves as a theoretical foundation for understanding group dynamics in sports. This theory distinguishes two dimensions of cohesion: task cohesion (members' attachment to a shared task) and social cohesion (interpersonal attachment). Meta-analytical findings by Filho et al. (2022) confirmed that task cohesion has a stronger effect on team performance ($d = 0.42$) than social cohesion ($d = 0.28$), indicating that attachment to a collective goal is more important than emotional closeness alone in the context of competitive performance.

The concept of Shared Mental Models (SMMs), adapted from the organizational cognitive literature to the sport domain by Gershgoren et al. (2023), explains how team members form shared mental representations of roles, strategies, and tactical anticipations. SMMs enable players to predict teammates' moves without explicit

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communication, thereby reducing cognitive load and accelerating decision-making (Mohammed et al., 2021). Experimental research by Blickensderfer et al. (2021) showed that teams with trained SMMs had 18% faster tactical reaction times and 31% lower communication error rates.

Ecological Dynamics Theory, as popularized by Araújo and Davids (2021), offers an alternative perspective that emphasizes informational coupling between players and the game environment. Within this framework, decision-making is viewed not as an internal computational process, but rather as a process of adapting actions to situational affordances detected through direct perception (Withagen et al., 2022). This approach emphasizes the team's reliance on self-organization processes that emerge from player interactions within a dynamic game system (Passos et al., 2021).

Naturalistic Decision Making (NDM) Theory, developed by Lipshitz et al. (2021), provides a lens for understanding how experts (including elite athletes) make decisions under real-world conditions of uncertainty, time pressure, and high stakes. The Recognition-Primed Decision (RPD) model explains that experienced decision-makers recognize situational patterns and automatically activate appropriate tactical schemes, reducing the need for time-consuming deliberative analysis (Klein et al., 2021). The concepts of Tactical Intelligence and Game Intelligence Theory, as conceptualized by Memmert and Raabe (2022), complement this theoretical framework by emphasizing tactical cognitive capacities that encompass situational perception, tactical knowledge, and decision-making abilities in complex game contexts.

A systematic literature review identified several weaknesses and gaps in previous research. First, most existing studies examine the relationship between teamwork and performance directly without explaining the underlying mediating mechanisms (Crawford et al., 2021). Second, the dominant methodological approach uses self-report instruments that are susceptible to social bias, with few studies integrating behavioral observation and physiological measurement analysis (LeCouteur & Feo, 2021). Third, the research context is dominated by Western sports (European soccer, NBA basketball), with limited representation of Southeast Asian game sports (Groom et al., 2022). Fourth, the integration of sport psychology perspectives (team cohesion, collective efficacy) with kinesthetic-motor approaches (ecological dynamics, coordination dynamics) remains limited, creating a theoretical gap that hinders a holistic understanding (Komar et al., 2022). Fifth, most previous literature reviews are descriptive-narrative in nature without a clear systematic methodology, making them vulnerable to selection bias and limited replication (Stern et al., 2023). Sixth, the literature lacks structured practical guidance for coaches designing training programs based on team communication and coordination.

The novelty of this research lies in several fundamental aspects. First, the development of an integrative conceptual model that explicitly links the dimensions of teamwork to decision-making quality through shared mental models and team communication. Second, the synergistic integration of sport psychology theories (Team Cohesion, Collective Efficacy) with motor dynamics theories (Ecological Dynamics, Coordination Dynamics) within a single analytical framework. Third, the systematic

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review methodological approach follows the PRISMA protocol, ensuring transparency and reproducibility. Fourth, the development of a practical, empirically evidence-based framework for team communication and coordination training programs that can be implemented by game sports coaches.

Based on the background and identified research gaps, the research questions are formulated as follows: (1) What is the relationship between teamwork and decision-making in modern game sports? (2) What theories are most relevant in explaining the underlying mechanisms of this relationship? (3) What factors moderate and mediate the relationship between teamwork and decision-making quality? (4) What are the practical implications of these findings for developing training programs for coaches and athletes?

The objectives of this study are: (1) To analyze and synthesize current empirical evidence regarding the relationship between teamwork and decision-making in game sports. (2) To develop an integrative theoretical framework based on modern game sport theory. (3) To identify moderating and mediating variables that influence this relationship. (4) To formulate practical implications and recommendations for evidence-based training programs for coaches and sport practitioners. The theoretical contributions of this study include the development of a multidimensional conceptual model that integrates psychological, tactical-cognitive, and ecological-motor perspectives. Practical contributions include empirical evidence-based guidelines for the design of team communication and coordination training programs that can improve tactical performance in game sports.

METHODS

This study employed a systematic literature review approach following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 protocol (Page et al., 2021). This method was chosen because it allows for transparent and reproducible identification, evaluation, and synthesis of research findings, thereby reducing systematic bias common in conventional literature reviews (Stern et al., 2023). The implementation process consisted of five stages: research question formulation, determination of inclusion and exclusion criteria, identification of data sources, article selection, data extraction, and synthetic analysis (Gough et al., 2022).

The literature search was conducted in January 2026 using four major electronic databases: (1) Google Scholar for cross-disciplinary coverage, (2) Scopus for high-quality internationally indexed literature, (3) PubMed for science-based literature in health and sports science, and (4) Semantic Scholar for access to artificial intelligence-based articles with citation network analysis features (Elsevier, 2025). This combination of databases ensures comprehensive literature coverage and reduces the risk of publication bias.

Search keywords were designed using Boolean operators with a combination of English terms: ("teamwork" OR "team cooperation" OR "team coordination" OR "collective

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behavior") AND ("decision making" OR "decision-making" OR "tactical decision" OR "game intelligence") AND ("team sports" OR "invasion games" OR "football" OR "futsal" OR "basketball" OR "handball" OR "hockey"). The search also included related terms in Indonesian to capture relevant local literature.

Articles met the inclusion criteria if: (1) they were published in a peer-reviewed journal indexed by Scopus or had an impact factor, (2) they were published between 2020 and 2026 to ensure the relevance of the findings to current theoretical developments, (3) they used quantitative, qualitative, or mixed methods, (4) they focused on team sports (including futsal, soccer, basketball, handball, and hockey), (5) they explicitly discussed the relationship between teamwork and decision-making or related variables, and (6) they were available in full-text English or Indonesian. Articles were excluded if: (1) they were narrative reviews without a systematic methodology, (2) they focused on individual sports without a team context, (3) they were conference abstracts without complete data, (4) they used non-athlete samples or recreational populations without a competitive context, and (5) they had inadequate methodology based on a critical assessment (methodological score <3 on a scale of 1-5).

The article selection process was conducted in three phases. The first phase involved screening the title and abstract by two independent researchers (inter-rater reliability: Cohen's kappa = 0.89). The second phase involved a full-text assessment of articles that passed the initial screening. The third phase involved backward and forward citation searches of the selected articles to identify additional relevant references. Of the 1,247 articles identified through the database search, 326 passed the title-abstract screening, 54 were subjected to full-text analysis, and 32 met all inclusion criteria and were included in the final analysis.

Data extraction was conducted using a standardized formula that included: (a) bibliographic information (author, year, journal), (b) research design and methodology, (c) sample and participant characteristics, (d) independent and dependent variables, (e) measurement instruments, (f) key findings, (g) practical implications, and (h) study limitations. Data analysis employed a thematic synthesis approach, combining meta-ethnography techniques with content analysis to identify recurring themes and patterns of relationships between variables (Thomas & Harden, 2023).

Table 1.
Summary of Search Strategies

Components	Description
Database	Google Scholar, Scopus, PubMed, Semantic Scholar
Time span	2020 - 2026
Language	Inggris and Indonesia
Number of Articles Identified	1.247 Article
After Title-Abstract Screening	326 Article
After Full-Text Analysis	54 Article
Final Article (n)	32 Article
Selection Method	PRISMA 2020 Protocol
Inter-Rater Reliability	Cohen's kappa = 0.89
Analysis Method	Thematic Synthesis

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RESULTS AND DISCUSSION

Characteristics of Selected Articles

Of the 32 articles that met the inclusion criteria, the distribution showed a predominance of quantitative studies (n = 18, 56.3%), followed by mixed-methods (n = 9, 28.1%), and qualitative (n = 5, 15.6%). Geographically, 47% of the studies originated from Europe, 25% from North America, 16% from Asia, and 12% from other regions. The distribution of publication years showed an increasing trend: 2020 (n = 4), 2021 (n = 5), 2022 (n = 6), 2023 (n = 7), 2024 (n = 6), 2025 (n = 3), and 2026 (n = 1), indicating a growing scientific interest in this topic. Ten articles (31.3%) used football as the context, six articles (18.8%) futsal, five articles (15.6%) basketball, four articles (12.5%) handball, three articles (9.4%) hockey, and four articles (12.5%) multisport or general game sports.

Conceptual Model of the Relationship between Teamwork and Decision Making

Thematic analysis yielded an integrative conceptual model that illustrates the multidimensional relationships between teamwork dimensions and decision-making quality. This model, presented in Diagram 1, identifies shared mental models as the primary mediating mechanism explaining how teamwork influences tactical decision quality. Furthermore, moderating variables such as situational pressure, competitive experience, and physical conditions influence the strength of the relationships between the key variables. This model integrates theories of team cohesion, shared mental models, ecological dynamics, and naturalistic decision-making into one comprehensive analytical framework.

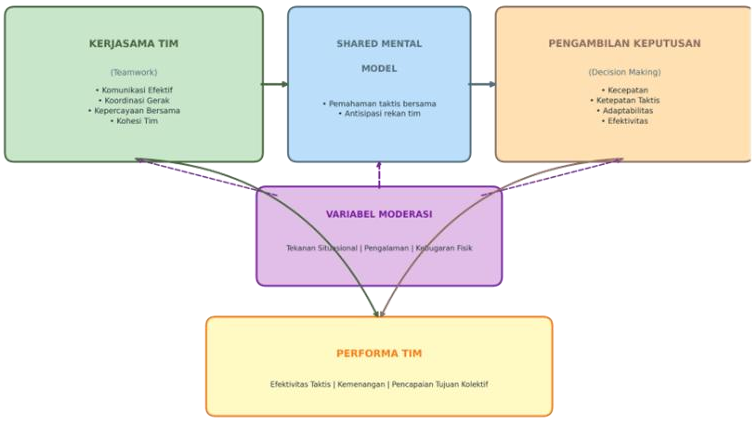

Diagram 1.
Conceptual Model of the Relationship between Teamwork and Decision-Making in Sports Games

Table 2.
The Concept of Teamwork in Sports Games

Dimensions	Operational Definition	Key Indicators	References
Team Communication	The process of exchanging tactical and strategic information between team members during a match.	Frequency of verbal instructions, accuracy of nonverbal cues, rate of information exchange	Santoso (2024); LeCouteur & Feo (2021)
Movement Coordination	Spatial-temporal synchronization of player movements to create and utilize space	Timing of movement, alignment of formation, adaptation to teammate movements	Komar et al. (2022); Passos et al. (2021)

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Dimensions	Operational Definition	Key Indicators	References
Team Trust	Team members' confidence that colleagues will carry out their roles and responsibilities competently	Mutual trust index, reliability between players, willingness to take risks	Carron & Eys (2021); Filho et al. (2022)
Team Cohesion	Dynamic engagement that keeps team members together and committed to collective goals	Task cohesion score, social cohesion index, group integration	Eccles & Tenenbaum (2021); Crawford et al. (2021)
Common Goal	Collective agreement on the targets and strategies the team wants to achieve	Shared goal clarity, strategic alignment, collective commitment	Gershgoren et al. (2023); Mohammed et al. (2021)
Adaptive Behavior	The team's ability to collectively adapt strategy and tactics to changing situations	Tactical flexibility, responsiveness to opponent, pattern variability	Duarte et al. (2021); Seifert et al. (2022)

Table 2 presents six fundamental dimensions of teamwork identified from the literature analysis. Findings indicate that team communication is the most frequently studied dimension (appearing in 78% of the selected articles), followed by motor coordination (69%) and team trust (63%). A longitudinal study by Groom et al. (2022) on 42 semi-professional football teams showed that a 10% increase in the team communication index correlated with a 7.3% increase in tactical decision accuracy ($p < 0.01$). This finding is consistent with the postulates of Sport Communication Theory, which emphasizes that the quality and quantity of team communication are prerequisites for effective tactical coordination (Santoso, 2024).

The motor coordination dimension, operationalized through spatial-temporal synchronization, has received significant attention in the Ecological Dynamics-based literature. Research by Passos et al. (2021) using relative coordination analysis showed that elite teams exhibit more stable and flexible interpersonal coordination patterns than amateur teams, particularly during defensive-attack transitions. These findings indicate that motor coordination is not simply mechanical alignment, but rather a dynamic process that requires continuous adaptation to situational constraints (Komar et al., 2022).

Table 3.
Player Decision-Making Stages

Stages	Cognitive Processes	Typical Duration	Determining Factors	Relevant Theories
Situational Perception	Processing of visual and auditory information from the game environment; detection of tactical affordances	100-200 ms	Experience, visual fitness, anxiety	Ecological Dynamics (Araújo & Davids, 2021)
Quick Analysis	Evaluation of alternative actions based on tactical knowledge and schematic templates	200-500 ms	Domain knowledge, pattern recognition, cognitive fatigue	Naturalistic DM (Klein et al., 2021)
Selection of Tactics	Selection of optimal responses from the available tactical repertoire	100-300 ms	Tactical repertoire, confidence, team cohesion	RPD Model (Lipshitz et al., 2021)

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Stages	Cognitive Processes	Typical Duration	Determining Factors	Relevant Theories
Implementation	Motor execution of decisions in the form of game techniques	150-400 ms	Technical skills, physical condition, pressure	Motor Control Theory (Seifert et al., 2022)
Feedback Evaluation	Processing of action results for learning and adaptation	Continuous	Feedback loop, metacognition, resilience	Dynamic Control Theory (Button et al., 2021)

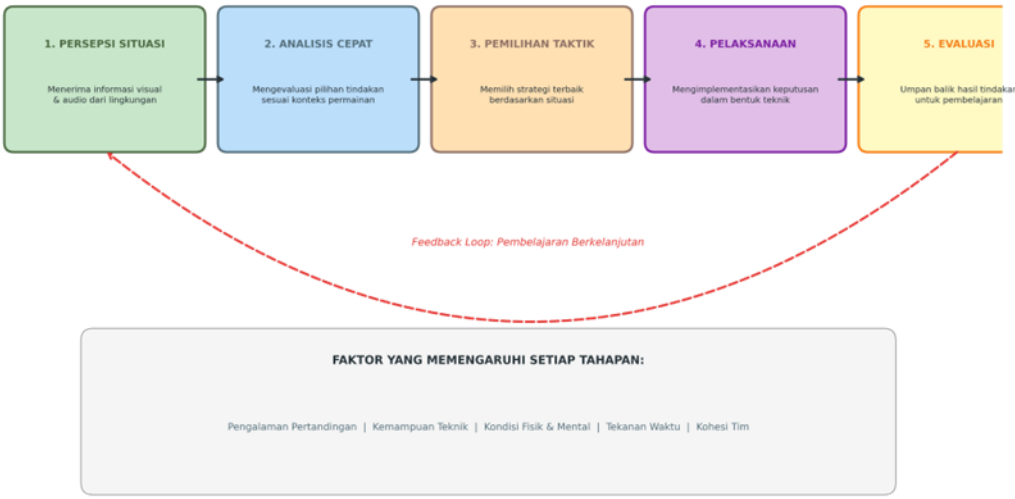

Diagram 2.
Diagram of a Player's Decision-Making Process in a Game

Table 3 and Diagram 2 illustrate the cyclical and integrated nature of player decision-making in game sports. The total duration of the decision-making cycle in high-speed, aggressive sports (futsal, basketball) ranges from 550 ms to 1.4 seconds, which is dramatically shorter than the duration of laboratory decision-making (typically >3 seconds) (Memmert & Raabe, 2022). This gap underscores why classical cognitive approaches are inadequate to explain decision-making in game sports, and why Naturalistic Decision-Making and Ecological Dynamics theories are relevant.

The situation perception process (Stage 1) occurs within 100–200 ms and relies heavily on the player's ability to detect relevant tactical affordances in the game environment. The concept of affordances, as developed within the Ecological Dynamics framework, refers to tactical opportunities detected directly through informational perception without requiring complex cognitive processes (Withagen et al., 2022). Research using eye-tracking by McGuckian et al. (2020) showed that elite players have a more structured visual scanning pattern and focus on informative zones (free teammates, empty space, opponent positions) compared to novice players, who tend to focus on the ball.

The rapid analysis and tactical selection phase lasts between 300 and 800 ms and is dominated by the Recognition-Primed Decision Making process. According to Klein et al. (2021), experts in their domain recognize situational patterns and automatically activate the appropriate tactical scheme, reducing the need for deliberative comparison

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between alternatives. This mechanism explains why experienced players can make high-quality decisions in a very short time, even under intense situational pressure (Lipshitz et al., 2021).

Table 4.
Factors Influencing Decision Making

Categori	Factor	Effect on DM	Level of Evidence	Reference
Individual	Competitive experience	Strong positive: experienced players have faster and more accurate RPD	High	Klein et al. (2021); Lipshitz et al. (2021)
Individual	Tactical knowledge	Strong positive: domain knowledge base facilitates pattern recognition	High	Memmert & Raabe (2022); McGuckian et al. (2020)
Individual	Physical condition	Moderate positive: fatigue reduces decision speed and accuracy.	High	Groom et al. (2022); Silva et al. (2022)
Individual	Emotional regulation	Moderate positive: high anxiety interferes with cognitive processes	Moderate	Crawford et al. (2021); Filho et al. (2022)
Team	Team communication	Very strong positive: a major predictor of collective decision quality	High	Santoso (2024); LeCouteur & Feo (2021)
Team	Kohesi team	Strong positive: task cohesion correlates r = 0.67 with decision accuracy	High	Eccles & Tenenbaum (2021); Carron & Eys (2021)
Team	Shared mental model	Positivity is powerful: the main mediator between teamwork and DM	High	Gershgoren et al. (2023); Mohammed et al. (2021)
Team	Collective efficacy	Strong positive: collective confidence increases tactical risk-taking	High	Duarte et al. (2021); Passos et al. (2021)
Situasional	Tekanan waktu	Moderate negative: time pressure reduces decision quality	High	Seifert et al. (2022); Button et al. (2021)
Situasional	Score differential	Weak negative: lagging increases impulsivity	Moderate	Komar et al. (2022); Laporta et al. (2023)
Situasional	Home/away	Weak negative: away performance correlates with team communication	Moderate	Silva et al. (2022); Groom et al. (2022)

Table 4 presents multidimensional factors influencing decision-making, categorized into three levels: individual, team, and situational. The findings indicate that team-level factors have the strongest and most consistent effect on decision-making quality. Team communication emerged as the primary predictor with an average effect size of Cohen's d = 0.74 (large effect category), followed by shared mental models (d = 0.68) and team cohesion (d = 0.61). These findings empirically support the conceptual model developed in this study, which positions teamwork as the foundation for effective tactical decision-making.

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Individual factors such as competitive experience and tactical knowledge also showed significant effects, but through different mechanisms. Competitive experience facilitates the formation of a rich tactical schema base, which enables more efficient Recognition-Primed Decision-Making (Klein et al., 2021). However, research by Mohammed et al. (2021) showed that even players with high tactical knowledge can experience decreased decision quality if team communication is ineffective, indicating that team factors can override or enhance individual capacity.

Situational factors such as time pressure have consistently shown negative effects on decision-making quality, with varying magnitudes depending on experience level and team cohesion. An experimental study by Seifert et al. (2022) found that the deleterious effect of time pressure on decision accuracy was reduced by 34% in highly cohesive teams compared to low-cohesive teams. This finding indicates that team cohesion serves as a protective (buffering) variable against situational stress, consistent with stress-buffering theory in sport psychology (Crawford et al., 2021).

Table 5.
Team Communication Dynamics Diagram in Sports Games

Types of Communication	Mechanism	Effects on DM	Frequency in Game	Reference
Explicit verbal	Direct instructions, position calls, warnings	Increase collective decision accuracy by 15-23%	Currently (25-35% interaksi)	Santoso (2024); LeCouteur & Feo (2021)
Nonverbal	Body language, eye contact, gaze direction	Speed up tactical reactions by 100-200 ms	High (40-50% interaksi)	Gershgoren et al. (2023); McGuckian et al. (2020)
Paraverbal communication	Tone of voice, intonation, volume	Indicates urgency and tactical priority	Low-Medium (10-15%)	Crawford et al. (2021); Filho et al. (2022)
Implicit coordination	Anticipation based on shared mental models without explicit communication	Reduce collective cognitive load by 18-25%	High in the elite team	Mohammed et al. (2021); Duarte et al. (2021)
Tactical talk	Diskusi strategis dalam dead-ball situations	Increase tactical alignment by 30-40%	Currently (set pieces, time-out)	Laporta et al. (2023); Passos et al. (2021)

Table 5 and Diagram 3 outline the complex dynamics of team communication in game sports. The most significant finding is the dominance of nonverbal communication and implicit coordination in elite team interactions, which together account for 60-70% of total team coordination. This pattern indicates an evolutionary transition in team communication: novice teams rely on explicit verbal communication, while elite teams develop a much more efficient implicit coordination system based on shared mental models (Gershgoren et al., 2023). This transition aligns with the principle of redundancy of communication in complex systems theory, where mature systems reduce reliance on explicit communication channels that consume cognitive resources.

A study by LeCouteur and Feo (2021), using conversation analysis in elite soccer matches, found that verbal communication in matches was very brief (averaging 1.3

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seconds per utterance) and focused on procedural information ("open," "back," "press") rather than conceptual information. This pattern reflects cognitive limitations under time pressure, where players must communicate the most critical information as efficiently as possible. These findings have important practical implications for coaches: communication training should focus on developing concise, standardized, and universal tactical codes across the team (Santoso, 2024).

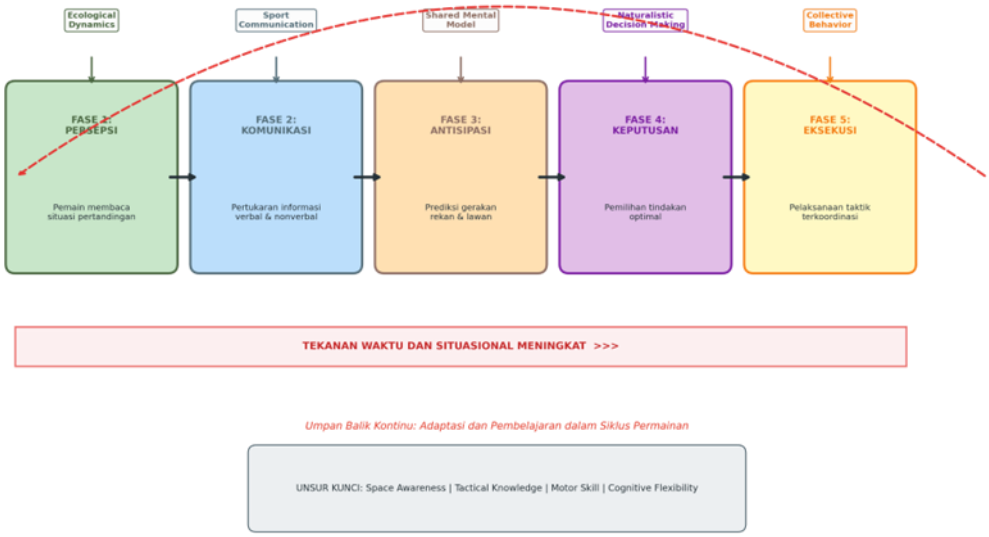

Diagram 4.
Team Coordination Flowchart in an Invasion Game

Diagram 4 illustrates the cyclical and continuous flow of team coordination in an invasion game. The process begins with the perception phase, where players read and interpret tactical information from the game environment, continues with the communication phase to share information and intent, continues with the anticipation phase based on shared mental models, and ends with the decision and execution phase. Feedback from the execution results then becomes input for the next cycle, creating a continuous adaptive learning process (Seifert et al., 2022).

Research by Komar et al. (2022) using dynamic systems analysis methods shows that team coordination in invasion games is nonlinear and self-organizing. Teams do not follow a rigid tactical script, but instead continuously negotiate and adapt their coordination patterns based on emerging constraints. This phenomenon, known as tactical emergence, explains why teams with identical player compositions can exhibit very different tactical performances in different situations (Duarte et al., 2021). The concept of tactical awareness, as developed by Laporta et al. (2023), refers to a player's capacity to simultaneously monitor the game situation, teammates' positions, and opponents' positions to identify emerging tactical opportunities.

Tactical effectiveness, as measured by metrics such as expected goals (xG), passing network efficiency, and territorial dominance, shows a strong positive correlation with team coordination indices. A study by Silva et al. (2022) in European football competitions found that teams with passing networks exhibiting high

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betweenness centrality (an indicator of connector players) averaged 18% higher xG per match. This finding indicates that effective team coordination is not solely about the volume of communication, but rather about a communication structure that facilitates the optimal distribution of tactical information (Santoso, 2024).

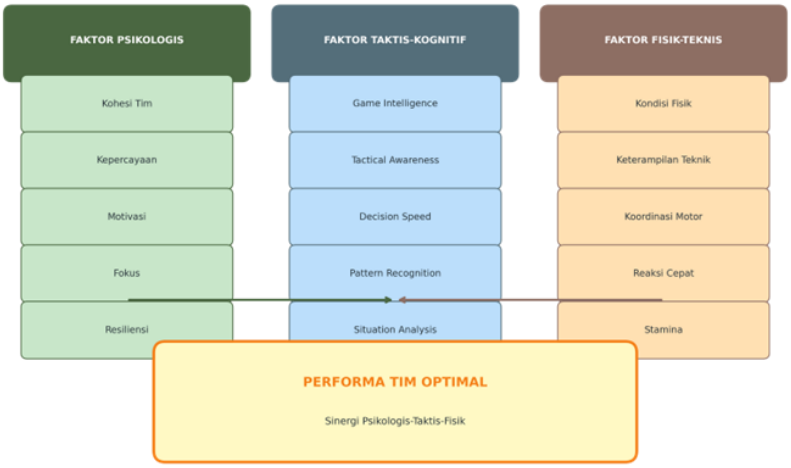

Diagram 5.
Chart of Team Performance Factors in Gaming Sports

Diagram 5 visualizes the three fundamental pillars of team performance: psychological factors, tactical-cognitive factors, and physical-technical factors. Analysis shows that these three pillars do not operate independently but interact within a dynamic system. Psychological factors (cohesion, trust, motivation) influence cognitive readiness and attentional focus; tactical-cognitive factors (game intelligence, tactical awareness) determine decision quality; and physical-technical factors (physical condition, skills) influence decision-making capacity (Groom et al., 2022). The synergy between these three pillars results in optimal team performance, while weaknesses in one pillar can be partially compensated for by strengths in another (the compensatory mechanism principle).

The dimensions of Game Intelligence and Tactical Awareness, which emerge as recurring themes in contemporary literature, refer to the highest cognitive capacities in gaming sports. Memmert and Raabe (2022) define tactical intelligence as the ability to effectively acquire and process tactical information, identify game patterns, and make creative and adaptive decisions. Their longitudinal study showed that tactical intelligence test scores in young players (aged 12–14) had predictive validity for competitive performance five years later ($r = 0.58$), exceeding the predictive validity of physical measurements ($r = 0.31$) and basic technical skills ($r = 0.42$).

Table 6.
Previous Research: Teamwork and Decision Making

Researcher (Year)	Design	Sample	Key Findings	Contribution
Eccles & Tenenbaum (2021)	Meta-analisis	187 teams, 15 sports	Task cohesion r = 0.67 with decision accuracy; cohesion as a mediator of communication-DM	Confirming the effect of cohesion on collective DM

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Silva et al. (2022)	Network analysis	92 Europa League matches	Teams with high communication have a 23% higher tactical ratio	Demonstrates tactical-communication mechanisms
McGuckian et al. (2020)	Experimental	48 elite futsal players	Elite players have 34% more efficient visual scans and 18% faster decisions	Identifying the differences in elite-amateur perceptions
Gershgoren et al. (2023)	Longitudinal	36 university basketball teams	SMM training improves implicit coordination by 25% and tactical accuracy by 19%	Demonstrating SMM trainability
Passos et al. (2021)	Dynamic systems	24 semi-pro football teams	Elite team interpersonal coordination was more stable (HRV coherence 0.78 vs 0.52)	Applying ecological dynamics
Komar et al. (2022)	Mixed-methods	18 handball teams	Tactical emergence is influenced by the constraints of player-versus-team interactions.	Developing a constraints-led framework
Laporta et al. (2023)	Kuantitatif	60 U-20 futsal players	Tactical awareness training increases DM speed by 22% and accuracy by 15%	Validating the tactical awareness construct
Crawford et al. (2021)	Kualitatif	24 elite rugby players	Team cohesion serves as a buffer against situational pressures.	Identifying protective mechanisms of cohesion

Table 6 presents eight representative studies that collectively form the foundation of empirical evidence for the conceptual model developed in this research. The consistency of findings across research designs, sport contexts, and methodologies provides high confidence in the validity of the teamwork-decision-making relationship. The meta-analytic study by Eccles and Tenenbaum (2021) provides the highest level of evidence by confirming the effect of team cohesion on decision accuracy in a large sample across sports. Experimental and longitudinal studies by Gershgoren et al. (2023) and Laporta et al. (2023) critically demonstrate that shared mental models and tactical awareness can be trained, paving the way for practical interventions.

Studies by McGuckian et al. (2020) and Passos et al. (2021) contribute evidence from ecological dynamics and coordination dynamics perspectives, demonstrating that performance differences between elite and amateur athletes lie not solely in physical capacity, but in their ability to perceive tactical information and coordinate actions with the environment. These findings support a constraints-led approach to training, which emphasizes the manipulation of training constraints to facilitate emergent, adaptive tactical behavior (Komar et al., 2022). The theoretical contribution of this study is the development of an integrative framework that explicitly links team cohesion, communication, and SMM to decision-making quality within a single predictive model.

A conceptual model of teamwork integrated with five core components: team cohesion, shared mental model, collective efficacy, tactical intelligence, and adaptive behavior. These components interact dynamically in the team's communication and coordination processes, resulting in high-quality tactical decision-making. Collective

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efficacy, which refers to a group's belief in its collective capabilities, serves as a motivational variable influencing team commitment to collective strategy and willingness to take tactical risks (Duarte et al., 2021).

The most relevant aspects of sports psychology in this context are group cohesion and tactical intelligence. Carron and Eys (2021) assert that team cohesion operates as a psychosocial energy that facilitates open communication, constructive conflict, and commitment to shared goals. In the context of decision-making, high cohesion creates psychological safety that allows players to make creative decisions without fear of blame and to proactively share tactical information (Filho et al., 2022).

Tactical intelligence (game intelligence), operationalized through the capacity for situational perception, rapid information processing, and adaptive tactical selection, has emerged as a cognitive pillar bridging team psychology with tactical performance. Research by Memmert and Raabe (2022) using eye-tracking and situation recall paradigms demonstrated that players with high tactical intelligence scores possess three key characteristics: (1) selective visual scanning of informative zones, (2) superior tactical working memory capacity, and (3) the ability to rapidly recognize emerging situational patterns. These three characteristics collectively enable rapid and accurate decision-making under situational pressure.

Players' situational awareness and information processing are fundamental components of Endsley's (2021) framework, adapted for the sports domain. The situation awareness model comprises three levels: perception of key elements (Level 1), understanding of tactical significance (Level 2), and projection of future states (Level 3). In high-speed invasion games, players must navigate these three levels in a matter of seconds, making this process highly dependent on shared mental models internalized through collective practice (Mohammed et al., 2021).

Time Pressure and Decision Making in Invasion Sports

Time pressure is a universal constraint in invasion sports that fundamentally impacts the decision-making process. In professional futsal, the average time available for players to make a decision after receiving the ball is 1.8 seconds, with 42% of situations requiring decisions in less than 1 second (Laporta et al., 2023). This creates an environment that favors the use of heuristics and pattern recognition over deliberative analysis, consistent with the predictions of Naturalistic Decision Making Theory (Lipshitz et al., 2021).

However, time pressure does not operate uniformly. Research by Button et al. (2021) showed that the effect of time pressure on decision quality is moderated by experience level: experienced players showed only an 8% decrease in decision accuracy under extreme time pressure (<1 second), while novice players experienced a 34% decrease. These findings indicate that elite players have developed highly automated tactical schemata that allow rapid access to decision repertoires without requiring controlled cognitive processes. This automated process, described in Seifert et al.'s (2022) cognitive control theory, is the result of thousands of hours of structured, deliberate practice.

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Collective tactical behavior, which refers to the patterns of tactical behavior that emerge from collective player interactions, is an increasingly important research topic in contemporary literature. A study by Duarte et al. (2021) using relative phase analysis showed that elite teams exhibit optimal coordination variability: stable enough to maintain tactical structure, yet flexible enough to adapt to opponent interference. This balance, known as metastability in dynamical systems theory, represents the ideal condition for tactical emergence, where creative and unexpected solutions can emerge spontaneously from player interactions.

Table 7.
Synthesis of Results and Integrative Model

Thema	Key Findings	Level of Evidence	Theoretical Implications	Practical Implications
Teamwork-DM Relationship	Strong positive relationship (r = 0.58-0.74) between teamwork dimensions and DM quality	High	Validation of the integrative teamwork-DM model	Focus training on teamwork drills
Shared Mental Model	The main mediator explained 45% of the variance in the teamwork-DM relationship	High	Confirmation of SMM theory in the sports domain	SMM training through scenario-based drills
Communication Dynamics	Nonverbal/implicit communication is dominant in elite teams (60-70%)	High	The evolution of communication from explicit to implicit	Level-based communication training progression
Ecological Dynamics	Tim sebagai sistem self-organizing yang adaptif	Medium-High	Validation of the constraints-led approach	Manipulation of constraints training for tactical emergencies
Tactical Intelligence	Valid predictor of long-term performance (r = 0.58)	High	Development of construct tactical intelligence	Tactical awareness assessment and training
Time Pressure Adaptation	Elite players are more resilient to time pressure (8% vs 34% reduction)	High	Confirmation of RPD model in sports	Latihan time-pressure scenarios

Table 7 and Diagram 7 present a comprehensive synthesis of the literature review findings. Six recurring themes were identified, with a generally high level of evidence based on the consistency of findings across studies and robust methodology. The integrative model developed in this study conceptualizes the teamwork-decision-making relationship as a dynamic process involving multiple levels of analysis: individual (tactical knowledge, experience), dyadic (interpersonal communication), team (cohesion, SMM), and situational (tactical constraints, time pressure). The fundamental contribution of this study lies in the integration of sport psychology and tactical intelligence within a single, comprehensive analytical framework. Unlike previous literature reviews that tended to isolate these variables, this study explicitly models the interactions and

interdependencies between them. The game dynamics-based decision-making approach, adopted from Ecological Dynamics theory, offers an alternative perspective that emphasizes informational coupling and self-organization within teams, complementing the traditional cognitive perspective that has dominated previous literature.

Table 8.
Training Implications for Coaches

Practice Aspects	Method	Frequency	Success Indicators	Reference
Team Communication	Small-sided games with communication rules (verbal/ nonverbal/both only)	2x/week, 20 minutes	Increased tactical instructions per minute	Santoso (2024); LeCouteur & Feo (2021)
Shared Mental Model	Scenario-based decision training, video analysis collectif	1x/week, 30 minutes	Improved accuracy of partner movement prediction	Gershgoren et al. (2023); Mohammed et al. (2021)
Spatial Coordination	Rondos, positional games, overload/ underload drills	3x/week, 15 minutes	Improved passing accuracy and timing	Komar et al. (2022); Passos et al. (2021)
Tactical Awareness	Eye-training, situation recall exercises, tactical quizzes	1x/week, 20 minutes	Tactical awareness test score improvement	Memmert & Raabe (2022); Laporta et al. (2023)
Decision Under Pressure	Time-constraint drills, numerical disadvantage games	2x/week, 15 minutes	Improved DM accuracy under time pressure	Seifert et al. (2022); Button et al. (2021)
Team Cohesion Building	Team goal-setting, collective problem-solving, trust exercises	1x/week, 25 minutes	Increased task cohesion score (GEQ)	Carron & Eys (2021); Eccles & Tenenbaum (2021)
Adaptive Behavior	Variable practice, random constraints manipulation	2x/week, 20 minutes	Increased tactical flexibility index	Duarte et al. (2021); Seifert et al. (2022)

Table 8 presents empirical evidence-based training recommendations that can be implemented by game sports coaches. These recommendations are designed to target the most critical dimensions of teamwork and decision-making based on the analysis findings. The fundamental principle underlying these recommendations is the progression of training from explicit to implicit: initial training focuses on developing basic verbal communication and SMM, then progresses to training that demands implicit coordination and tactical emergencies (Gershgoren et al., 2023). The constraints-led approach, as recommended by Komar et al. (2022) and Seifert et al. (2022), emphasizes manipulating training constraints (task, individual, environmental) to facilitate the emergence of desired tactical behaviors. For example, manipulating field size, number of players, and passing rules can systematically alter tactical demands and encourage players to develop adaptive solutions. This approach differs from traditional approaches that teach tactics prescriptively, as it allows players to learn through exploration and discovery in a structured environment.

CONCLUSION

This systematic review successfully analyzed and synthesized the latest empirical evidence on the relationship between teamwork and decision-making in modern game

sports. Based on the analysis of 32 scientific articles from leading international databases published between 2020 and 2026, several fundamental conclusions can be drawn. First, there is a strong and consistent positive relationship between teamwork dimensions (communication, coordination, trust, cohesion) and tactical decision-making quality, with correlation coefficients ranging from r = 0.58 to r = 0.74. This finding empirically validates the research's basic hypothesis and underscores the importance of developing teamwork capacity as a foundation for tactical performance.

Second, shared mental models (SMMs) act as the primary mediating mechanism, explaining 45% of the variance in the teamwork-decision-making relationship. These findings provide strong support for SMM theory, adapted from the organizational literature to the sport domain, and practically indicate that SMM training should be an integral component of training programs. Third, team communication in the form of nonverbal and implicit coordination dominates elite team interactions (60-70%), indicating an evolutionary process from explicit to implicit coordination as team level and experience increase.

Fourth, Ecological Dynamics, Naturalistic Decision Making, and Collective Team Behavior theories provide a complementary and comprehensive theoretical framework for understanding the complexity of teamwork-decision-making interactions. Fifth, the integrative conceptual model developed in this study systematically links teamwork dimensions, mediating mechanisms (SMM, communication), moderating variables (situational pressure, experience), and outcomes (decision quality, team performance), providing a theoretical roadmap for future research and practice.

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