

Basketball IQ Project

Assignment 1: Literature Review

Research Team Assignment

Project Overview:
Developing a Comprehensive Framework for
Basketball Strategy Analysis and Player Evaluation

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1 Project Background and Motivation

The Basketball IQ Project aims to develop a comprehensive analytical framework for understanding basketball strategy, player evaluation, and team composition. Drawing inspiration from game theory concepts in poker (specifically exploitative vs. GTO strategies), this project seeks to identify both:

- (a) **Exploitative opportunities:** Areas where players and teams systematically underperform or exhibit structural weaknesses
- (b) **Game-theoretically optimal (GTO) strategies:** Core principles and metrics that consistently characterize successful basketball play

This dual-framework approach will enable us to:

- Identify market inefficiencies in player evaluation
- Understand fundamental basketball principles that transcend specific matchups
- Develop predictive models for team success
- Create actionable insights for team building and strategy

2 Assignment Overview

This literature review assignment represents the foundational phase of the Basketball IQ Project. Your task is to conduct a comprehensive review of academic research, industry analysis, and basketball theory across four key areas. This review will inform our subsequent empirical analysis and model development.

2.1 Assignment Objectives

By the end of this assignment, the research team will have:

1. Identified the most predictive metrics for team success in basketball
2. Catalogued individual player metrics that contribute to optimal team composition
3. Documented systematic weaknesses in player and team performance
4. Synthesized basketball theory regarding optimal strategy (GTO basketball)
5. Mapped available data sources for high school basketball in the DMV and NY regions
6. Outlined data infrastructure requirements for advanced statistical analysis

2.2 Deliverables

Primary Deliverable: A comprehensive written literature review (20-30 pages, excluding references) addressing all research questions outlined in Section 3.

Format Requirements:

- PDF document, professionally formatted
- 12-point font, 1-inch margins, double-spaced (excluding tables and figures)
- Proper citations using APA, Chicago, or IEEE format (be consistent)
- Executive summary (2 pages maximum)
- Annotated bibliography of at least 40 sources

3 Research Questions and Framework

Your literature review should be organized around the following four major research areas. Each area contains specific research questions that should be addressed comprehensively.

3.1 Research Area 1: Exploitative Strategy Framework

3.1.1 Focus

Understanding systematic weaknesses and exploitable patterns in basketball performance at both individual and team levels.

3.1.2 Research Questions

RQ 1.1: Predictive Metrics for Team Success

- What individual and team metrics have been empirically demonstrated to predict winning in basketball?
- How do different metrics interact? (e.g., Does offensive rebounding rate matter more when three-point shooting percentage is low?)
- What is the relative importance of offensive vs. defensive metrics in predicting outcomes?
- How have predictive metrics evolved with changes in basketball strategy (e.g., the three-point revolution)?
- What metrics are most predictive at different levels of play (NBA, college, high school)?

RQ 1.2: Individual Metrics and Team Composition

- What individual player metrics best predict contribution to team success?
- How do player metrics combine to create optimal team compositions? (complementarity vs. redundancy)
- What is the evidence for position-specific metrics and their importance?
- How do synergy effects between players manifest in measurable statistics?
- What role do “intangibles” (leadership, chemistry, etc.) play, and can they be quantified?

RQ 1.3: Systematic Weaknesses and Structural Constraints

- What metrics are most difficult for players to achieve/maintain consistently?
- What are the most common systematic weaknesses in player development at the high school level?
- What structural constraints limit high school team performance? (e.g., roster size, player eligibility, practice time)
- Are there identifiable patterns in what skills/metrics teams and players undervalue?
- What positional or stylistic weaknesses are most commonly exploited in successful strategies?
- How do physical constraints (height, wingspan, athleticism) create systematic limitations?

3.2 Research Area 2: Game-Theoretically Optimal (GTO) Basketball

3.2.1 Focus

Identifying fundamental principles and strategies that characterize optimal basketball play, independent of specific opponents.

3.2.2 Research Questions

RQ 2.1: Core Principles of Optimal Play

- What do basketball theorists and researchers define as “optimal” or “fundamental” basketball?
- What strategic principles are consistently associated with winning teams across eras and rule changes?
- How do successful systems balance offensive efficiency, defensive effectiveness, and pace?
- What are the theoretical foundations for shot selection, spacing, and ball movement?

RQ 2.2: Consistent Characteristics of Elite Teams

- What do championship teams and consistently successful programs do that others don’t?
- What statistical profiles characterize elite teams across different eras?
- How do elite teams balance individual talent with system effectiveness?
- What defensive and offensive systems have proven most robust over time?

RQ 2.3: Strategic Frameworks and Systems

- What offensive and defensive systems have been most successful historically?
- How do successful coaches and systems adapt to rule changes and meta-game shifts?
- What role does pace and style of play have in determining optimal strategy?
- How do different basketball philosophies (e.g., pace-and-space, defensive-oriented, inside-out) compare in effectiveness?

RQ 2.4: Shot Selection and Efficiency

- What does research say about optimal shot distribution?
- How has the analytics revolution changed understanding of shot value?
- What is the theoretical and empirical basis for the three-point revolution?
- How should teams balance high-percentage shots with shot volume and variance?

3.3 Research Area 3: Advanced Analytics and Methodology

3.3.1 Focus

Understanding the current state of basketball analytics, including methodological approaches, metrics, and analytical frameworks.

3.3.2 Research Questions

RQ 3.1: Advanced Metrics and Their Construction

- What advanced metrics exist beyond traditional box score statistics? (e.g., PER, Win Shares, BPM, RPM, RAPTOR, EPM)
- How are these metrics calculated and what are their theoretical foundations?
- What are the strengths and weaknesses of each major advanced metric?
- How do tracking data and spatial statistics enhance traditional metrics?
- What metrics capture defensive impact most effectively?

RQ 3.2: Predictive Modeling and Statistical Methods

- What statistical and machine learning methods have been applied to basketball analysis?
- What approaches have been most successful for predicting game outcomes, player development, and team performance?
- How do researchers handle small sample sizes and statistical noise in basketball data?
- What methods exist for adjusting statistics for strength of competition?
- How do researchers model player aging curves and career trajectories?

RQ 3.3: Causal Inference and Impact Measurement

- How do researchers isolate individual player impact from team context?
- What methods exist for measuring lineup effectiveness and player combinations?
- How can we distinguish correlation from causation in basketball analytics?
- What experimental or quasi-experimental designs have been used in basketball research?

3.4 Research Area 4: Data Sources and Infrastructure

3.4.1 Focus

Identifying available data sources for high school basketball in the DMV (DC, Maryland, Virginia) and New York regions, and understanding data requirements for our research questions.

3.4.2 Research Questions

RQ 4.1: High School Basketball Data Availability

- What publicly available data sources exist for high school basketball in the DMV and NY?
- What statistics and data do high school leagues and associations collect?
- What commercial or proprietary databases might be accessible? (e.g., recruiting services, stats providers)
- What is the quality, completeness, and consistency of available high school data?

- Are there opportunities for original data collection or partnerships?

RQ 4.2: Data Requirements and Gaps

- What data elements are necessary to answer our research questions?
- What advanced statistics require play-by-play data vs. box score data?
- What data gaps exist between what we need and what is available?
- How can we construct necessary metrics from available data?
- What assumptions or approximations might be necessary given data limitations?

RQ 4.3: Data Integration and Infrastructure

- How can multiple data sources be integrated effectively?
- What data cleaning and validation procedures are necessary?
- What are best practices for basketball data management and storage?
- How do we handle missing data, inconsistent reporting, and measurement error?
- What tools and platforms are commonly used in basketball analytics?

RQ 4.4: Benchmarking and Contextualization

- How can high school data be benchmarked against college or professional data?
- What adjustment factors might be necessary for comparing across competitive levels?
- How do we account for differences in game length, rules, and style of play?
- What external data sources might provide context? (e.g., recruiting rankings, college performance)

4 Research Methodology and Expectations

4.1 Literature Search Strategy

Your literature review should draw from multiple sources and domains:

4.1.1 Academic Literature

- Peer-reviewed journals in sports analytics, statistics, and sports science
- Conference proceedings (e.g., MIT Sloan Sports Analytics Conference)
- Dissertations and theses on basketball analytics
- Operations research and optimization journals

4.1.2 Industry and Practitioner Sources

- NBA and basketball analytics blogs and publications
- Team and consultant white papers (where available)
- Analytics-focused media outlets (e.g., FiveThirtyEight, The Athletic analytics sections)
- Technical documentation from stats providers (e.g., Second Spectrum, Synergy Sports)

4.1.3 Basketball Theory and Coaching Literature

- Coaching books and manuals
- Basketball strategy publications
- Historical analysis of successful teams and systems

4.1.4 Data and Technical Sources

- Documentation from basketball data providers
- High school athletic association websites and publications
- Recruiting service methodologies and reports
- Open-source basketball analytics tools and repositories

4.2 Quality and Depth Expectations

4.2.1 Source Requirements

- Minimum 40 cited sources across all categories
- Balance between academic rigor and practical applicability
- Include seminal works and recent developments (last 5 years)
- Critically evaluate source quality and methodology

4.2.2 Analysis Expectations

- **AI-assisted synthesis:** Use AI to help identify themes, consensus, and debates across sources, but validate the analysis
- **Critical evaluation:** Assess methodological strengths and weaknesses - verify that AI hasn't mischaracterized research methods
- **Gap identification:** Clearly articulate what is known vs. what remains uncertain
- **Practical implications:** Connect academic findings to project objectives
- **Source verification:** Every claim should be traceable to a real, accessible source

4.2.3 Organization and Clarity

- Clear logical flow within and between sections
- Use of tables and figures to summarize complex information
- Precise terminology and consistent definitions
- Accessible to readers with varying levels of basketball and statistical knowledge

4.3 Collaborative Research Guidelines

This is a team assignment leveraging AI tools for efficiency:

- **Division of labor:** Assign research areas or questions to team members based on expertise and interest
- **AI-first approach:** Use AI tools (Claude, ChatGPT, Perplexity, etc.) to generate initial literature summaries and drafts
- **Validation responsibility:** Each team member is responsible for validating their AI-generated content against original sources
- **Regular coordination:** Share findings, discuss validation results, and ensure integration
- **Quality control:** Peer review each section for logical consistency and source accuracy before final submission
- **Unified voice:** The final document should read as a cohesive whole, not disconnected sections

5 Deliverable Structure

Your final literature review should be organized as follows:

5.1 Required Sections

1. Executive Summary (2 pages max)

- Key findings for each research area
- Major themes and insights
- Critical gaps in existing knowledge
- Recommendations for next steps

2. Introduction (2-3 pages)

- Project motivation and objectives
- Conceptual framework (exploitative vs. GTO)
- Overview of research areas
- Organization of the review

3. Research Area 1: Exploitative Strategy Framework (5-7 pages)

- Address all RQ 1.x questions
- Synthesize findings on predictive metrics
- Document systematic weaknesses and structural constraints

4. Research Area 2: Game-Theoretically Optimal Basketball (5-7 pages)

- Address all RQ 2.x questions
- Synthesize principles of optimal play
- Document characteristics of elite teams and systems

5. Research Area 3: Advanced Analytics and Methodology (4-6 pages)

- Address all RQ 3.x questions
- Catalog advanced metrics and methods
- Evaluate analytical approaches

6. Research Area 4: Data Sources and Infrastructure (4-6 pages)

- Address all RQ 4.x questions
- Document DMV and NY high school data sources
- Identify data gaps and requirements

7. Integration and Synthesis (3-4 pages)

- How do findings across research areas connect?
- What overarching themes emerge?
- How does existing research address (or fail to address) our dual framework?

8. Gaps and Future Research Directions (2-3 pages)

- What questions remain unanswered?

- What methodological challenges exist?
- What are the priorities for our empirical research?

9. Conclusion (1-2 pages)

- Summary of key insights
- Implications for the Basketball IQ Project
- Next steps

10. References

- Comprehensive bibliography
- Properly formatted citations

11. Appendices (as needed)

- Annotated bibliography
- Detailed tables of metrics, data sources, etc.
- Glossary of basketball and statistical terms

6 Resources and Support

6.1 Recommended Starting Points

The following resources may serve as useful entry points into the literature (not exhaustive):

6.1.1 Key Publications and Venues

- Journal of Quantitative Analysis in Sports
- MIT Sloan Sports Analytics Conference proceedings
- Nylon Calculus (analytics blog)
- Basketball Reference (for NBA statistics and methodology)
- Cleaning the Glass (subscription analytics site)

6.1.2 Foundational Works

- Dean Oliver - *Basketball on Paper*
- Ben Alamar and Vijay Mehrotra - various papers on NBA analytics
- Kirk Goldsberry - *Spraychart* and spatial analytics research
- Daryl Morey and the Houston Rockets analytics approach (various articles)

6.1.3 Data Sources to Investigate

- MaxPreps (high school statistics)
- State athletic associations (VHSL, MPSSAA, NYSPHSAA, DCIAA)
- Recruiting services (247Sports, Rivals, ESPN)
- Local leagues and conference websites

6.2 Team Support

- Schedule regular team meetings to discuss progress and findings
- Use shared document platforms for collaboration
- Establish a shared reference manager (Zotero, Mendeley, etc.)
- Create a shared folder for PDFs and resources

7 Timeline and Milestones

This assignment is designed to be completed in approximately 2 weeks using AI tools to accelerate research and synthesis. We recommend the following timeline:

7.1 AI-Assisted Research Best Practices

This project encourages heavy use of AI tools to accelerate the research process. However, the research team must ensure quality and accuracy:

- **Always validate:** AI can hallucinate sources or misrepresent findings. Verify every claim against the original source.
- **Check citations:** Ensure cited papers actually exist and say what the AI claims they say.
- **Evaluate logic:** AI can generate plausible-sounding but logically inconsistent arguments. Think critically about synthesis.
- **Cross-reference:** Compare AI-generated summaries across multiple tools and against human expert sources.
- **Use AI for efficiency, not replacement:** Let AI handle initial literature gathering, summarization, and drafting, but apply human judgment for validation, synthesis, and insight generation.

8 Questions and Clarifications

If you have questions about this assignment:

- Email the project lead with specific questions
- Schedule office hours for complex conceptual questions

- Use team meetings to discuss interpretation and scope

This literature review is the foundation upon which our entire Basketball IQ Project will be built. Invest the time and intellectual effort to make it comprehensive, rigorous, and insightful. Good luck!

Phase	Duration	Deliverable/Activity
Week 1	Days 1-2	<ul style="list-style-type: none"> • Team organization and research area assignment • Set up collaboration tools and shared workspace • Initial AI-assisted literature search and source gathering
Week 1	Days 3-5	<ul style="list-style-type: none"> • Use AI to generate comprehensive literature summaries • Validate AI-generated content against original sources • Verify claims, statistics, and citations for accuracy • Share validated findings with team
Week 1	Days 6-7	<ul style="list-style-type: none"> • Individual sections drafted (with AI assistance) • Critical review of AI outputs for logical consistency • Cross-reference claims across multiple sources • Identify and fill gaps in coverage
Week 2	Days 8-10	<ul style="list-style-type: none"> • Integration of all sections • Ensure consistency in terminology and framework • Validate that synthesis makes logical sense • Address any remaining data gaps
Week 2	Days 11-12	<ul style="list-style-type: none"> • Team peer review of complete draft • Final validation of sources and claims • Executive summary creation • Editing and refinement
Week 2	Days 13-14	<ul style="list-style-type: none"> • Final quality check and citation verification • Format and proofread • Prepare annotated bibliography • Final document assembly and submission