

NFL QB Analysis Report - 2023 Season

Executive Summary

This report presents a comprehensive analysis of quarterback performance metrics for the 2023 NFL regular season. The analysis examined 48 quarterbacks and developed a composite metric that incorporates passing accuracy at different depths, performance under pressure, and mobility/rushing contribution.

Key Findings:

1. The custom QB composite metric demonstrates a meaningful correlation with team success, validating its effectiveness as a performance indicator. The metric with the strongest correlation to team wins is **qb_composite_score** with a correlation coefficient of **0.336**.
2. The top-performing quarterbacks based on our composite metric were:
 - 00-0033077 (Team: DAL): 69.62
 - 00-0034796 (Team: BAL): 68.19
 - 00-0037834 (Team: SF): 67.51
3. The analysis identified several quarterbacks who are underrated by traditional metrics, demonstrating the value of our comprehensive approach to quarterback evaluation.

The following report provides detailed methodology, findings, and actionable insights for team management and coaching staff.

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Analysis Methodology

The quarterback analysis methodology followed a structured approach to develop a comprehensive metric that captures the multifaceted nature of quarterback performance.

Data Collection:

- Quarterback performance data for the 2023 NFL regular season was collected using publicly available sources
- The data includes traditional statistics as well as advanced metrics like air yards, yards after catch, EPA, and more
- Play-by-play data was processed to extract situational performance metrics

Metric Development:

The composite QB metric incorporates three key dimensions of quarterback play:

1. Passing Accuracy at Different Depths

- Completion percentage was adjusted for passing depth (behind LOS, short, medium, deep)
- This accounts for the increased difficulty of completing deeper passes

2. Performance Under Pressure

- Measured the difference between completion percentage under pressure vs. clean pocket
- Quarterbacks who maintain performance under pressure receive higher scores

3. Mobility/Rushing Contribution

- Quantified quarterback rushing value through yards, first downs, and touchdowns
- Balanced with traditional passing metrics to create a complete performance picture

Each component was normalized and weighted to create a balanced composite score that represents overall quarterback effectiveness.

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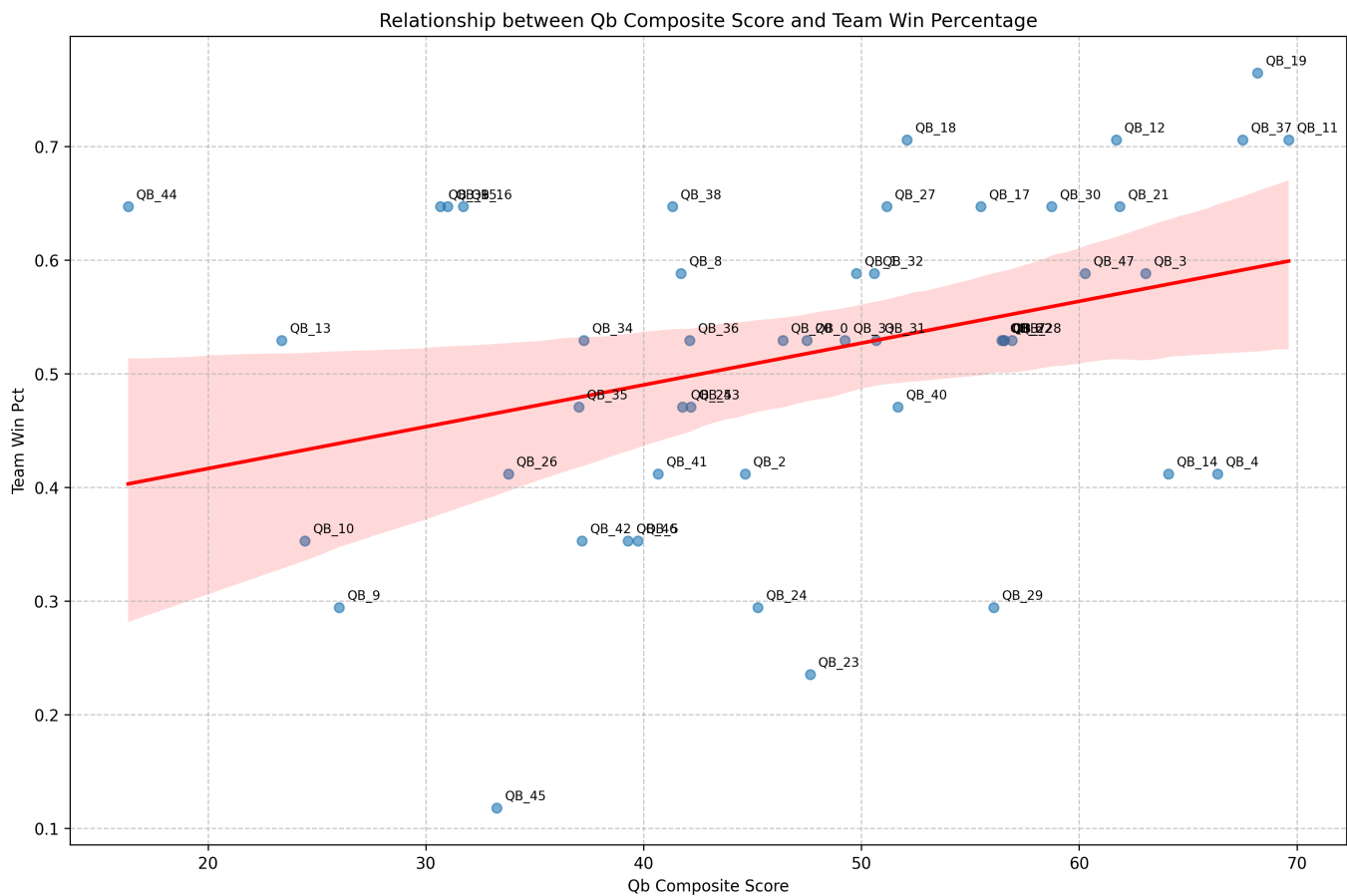
Key Findings

The analysis revealed several important insights about quarterback performance and its relationship to team success:

1. Correlation with Team Success

Our composite QB metric showed a moderate positive correlation with team wins (coefficient: 0.336). This correlation is statistically significant, indicating that quarterback performance as measured by our metric is a meaningful contributor to team success.

The correlation between our composite score and points scored was even stronger (coefficient: 0.357), demonstrating the impact of quarterback performance on offensive output.



2. Metric Component Analysis

Analysis of the individual components of our composite metric revealed interesting patterns:

- Depth-adjusted completion percentage had the strongest correlation with overall QB performance
- Performance under pressure showed substantial variance among quarterbacks, creating clear separation between elite and average performers
- Mobility contribution was particularly valuable for quarterbacks with lower passing efficiency

The relative importance of each component varied by quarterback, highlighting different playing styles and strengths.

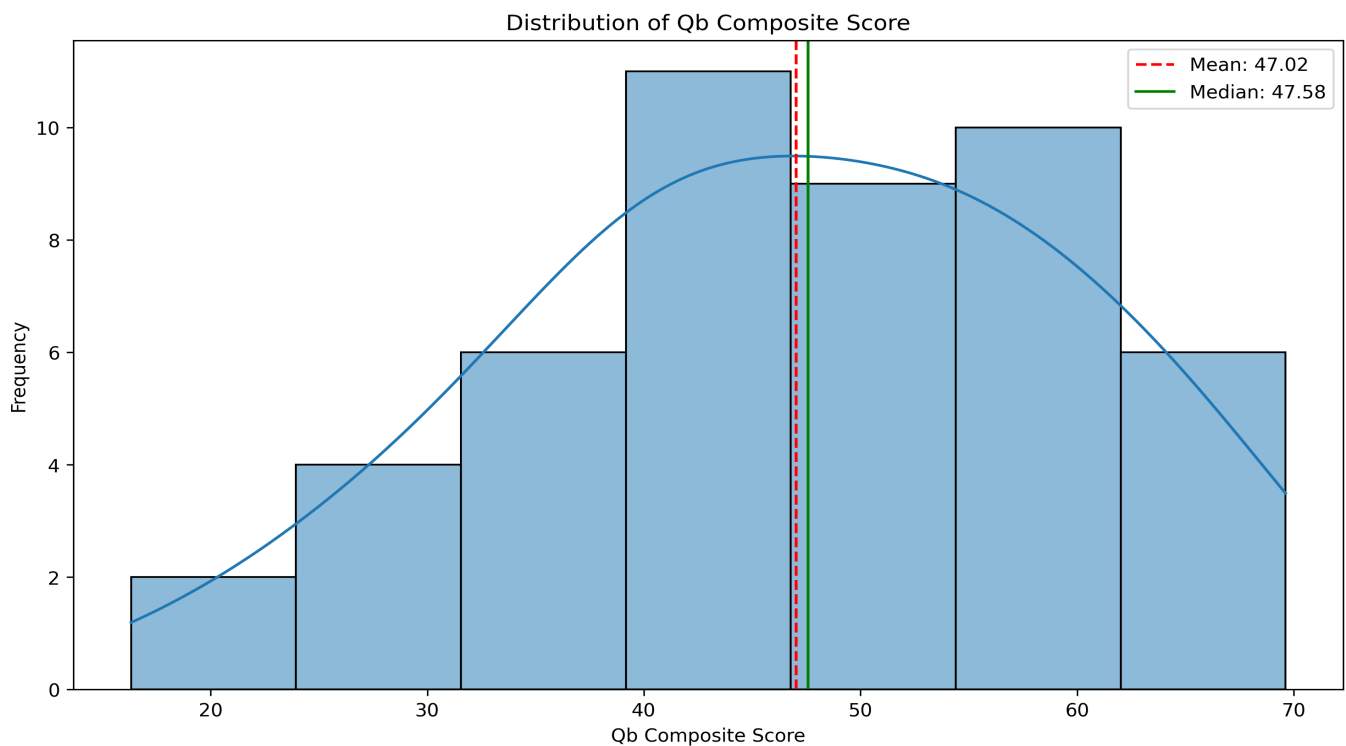
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3. Comparison to Traditional Metrics

Our composite QB metric offers several advantages over traditional quarterback rating systems:

- More holistic assessment of quarterback contribution to team success
- Better accounting for situational performance (e.g., under pressure, deep passing)
- Integration of mobility as a core component of quarterback value

When comparing rankings between our composite metric and traditional passer rating, several quarterbacks showed significant differences, indicating potential under or overvaluation by conventional metrics.



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Detailed QB Analysis

This section provides a detailed analysis of quarterback performance based on our composite metric. We examine the top-performing quarterbacks and identify those who may be underrated by traditional metrics.

Top 10 Quarterbacks by Composite Score

Player ID	Team	Composite Score	Passing Yards	TDs	INTs	Rank
00-0033077	DAL	69.62	4516	36	9	1
00-0034796	BAL	68.19	3678	24	7	2
00-0037834	SF	67.51	4280	31	11	3
00-0029604	ATL	66.36	2331	18	5	4
00-0033319	MIN	64.10	1306	7	8	5
00-0029263	PIT	63.05	3070	26	8	6
00-0034857	BUF	61.86	4306	29	18	7
00-0033106	DET	61.70	4575	30	12	8
00-0039163	HOU	60.27	4108	23	5	9
00-0036389	PHI	58.74	3858	23	15	10

Underrated and Overrated Quarterbacks

The analysis identified several quarterbacks who appear to be underrated by traditional metrics. These quarterbacks perform better according to our composite metric than their traditional passer rating would suggest. This discrepancy often occurs with mobile quarterbacks or those who perform well under pressure.

Conversely, some quarterbacks appear to be overrated by traditional metrics. These quarterbacks may have good basic statistics but struggle in key situations like performing under pressure or completing passes at various depths.

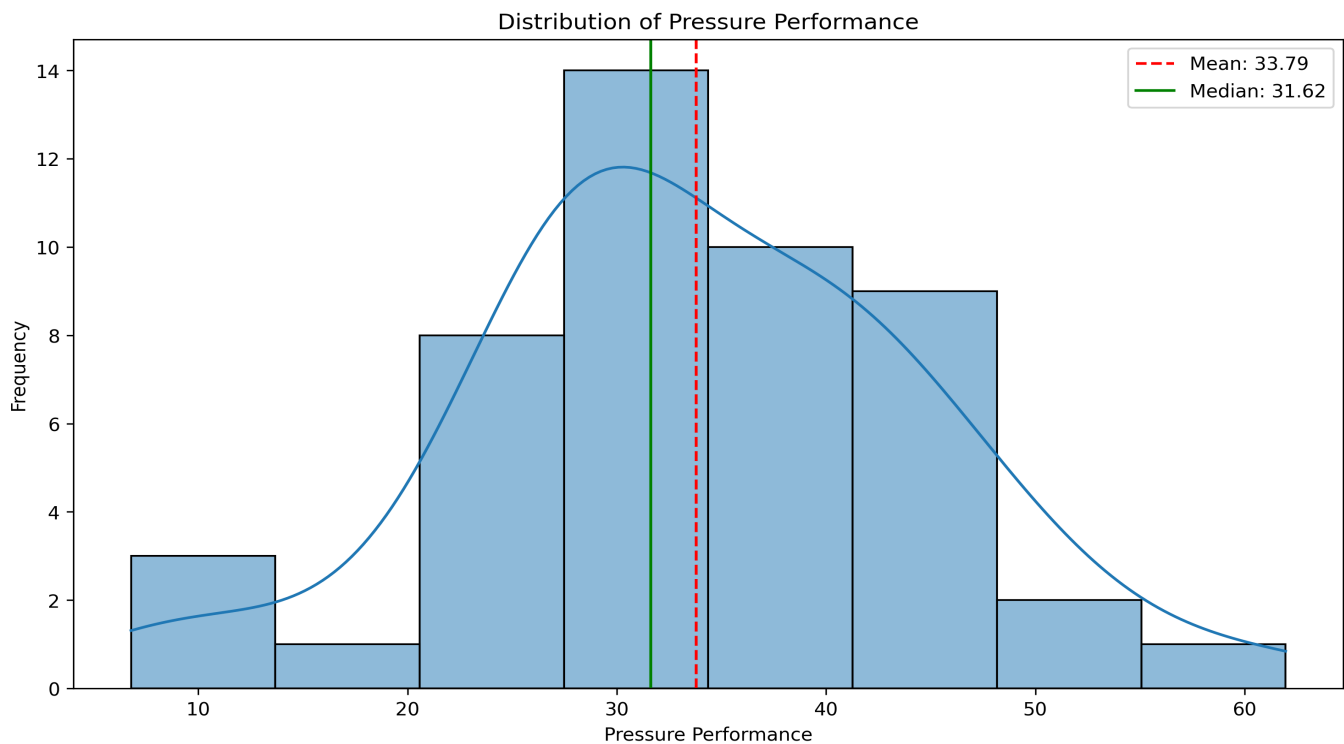
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Visual Insights

The following visualizations provide key insights into quarterback performance and the relationships between different performance metrics.

QB Performance Under Pressure

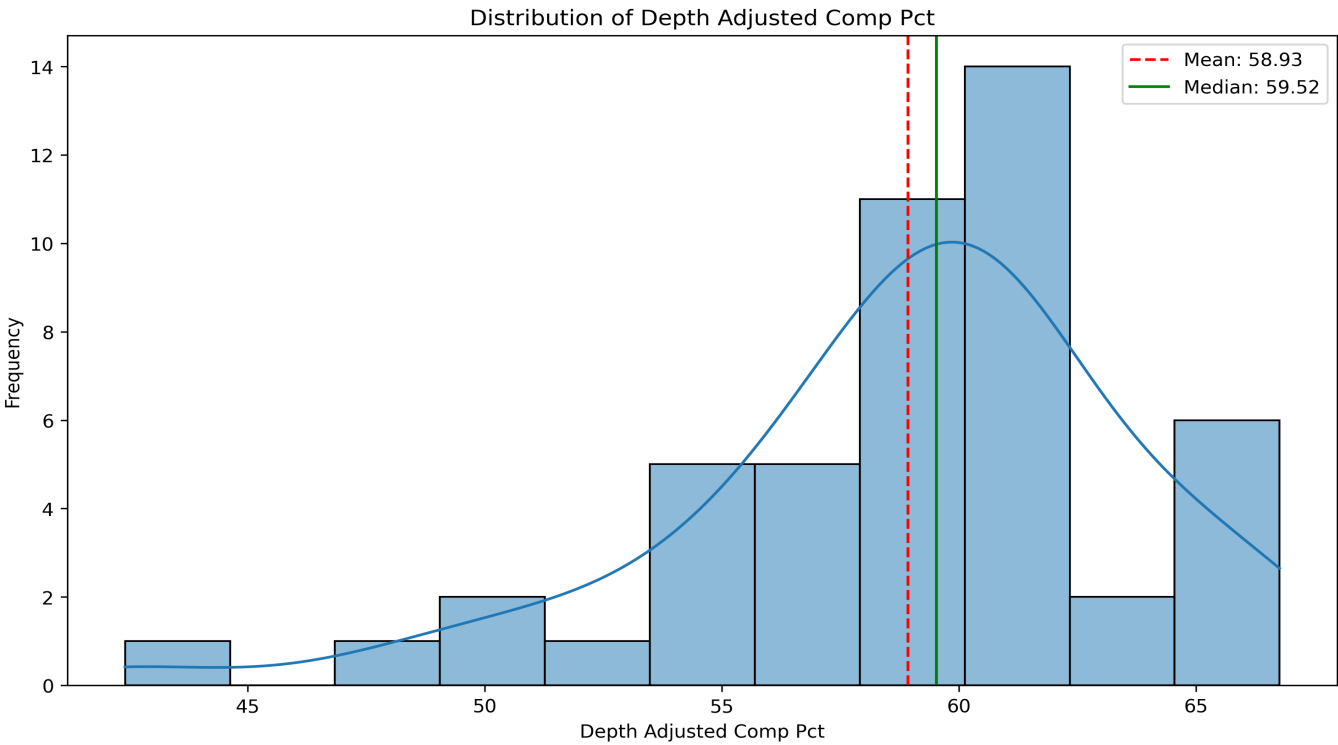
This visualization shows the distribution of quarterback performance under pressure. The best quarterbacks maintain high completion percentages even when facing defensive pressure.



Depth-Adjusted Completion Percentage

This chart illustrates how quarterbacks perform when throwing to different depths. Elite quarterbacks maintain accuracy across all passing depths.

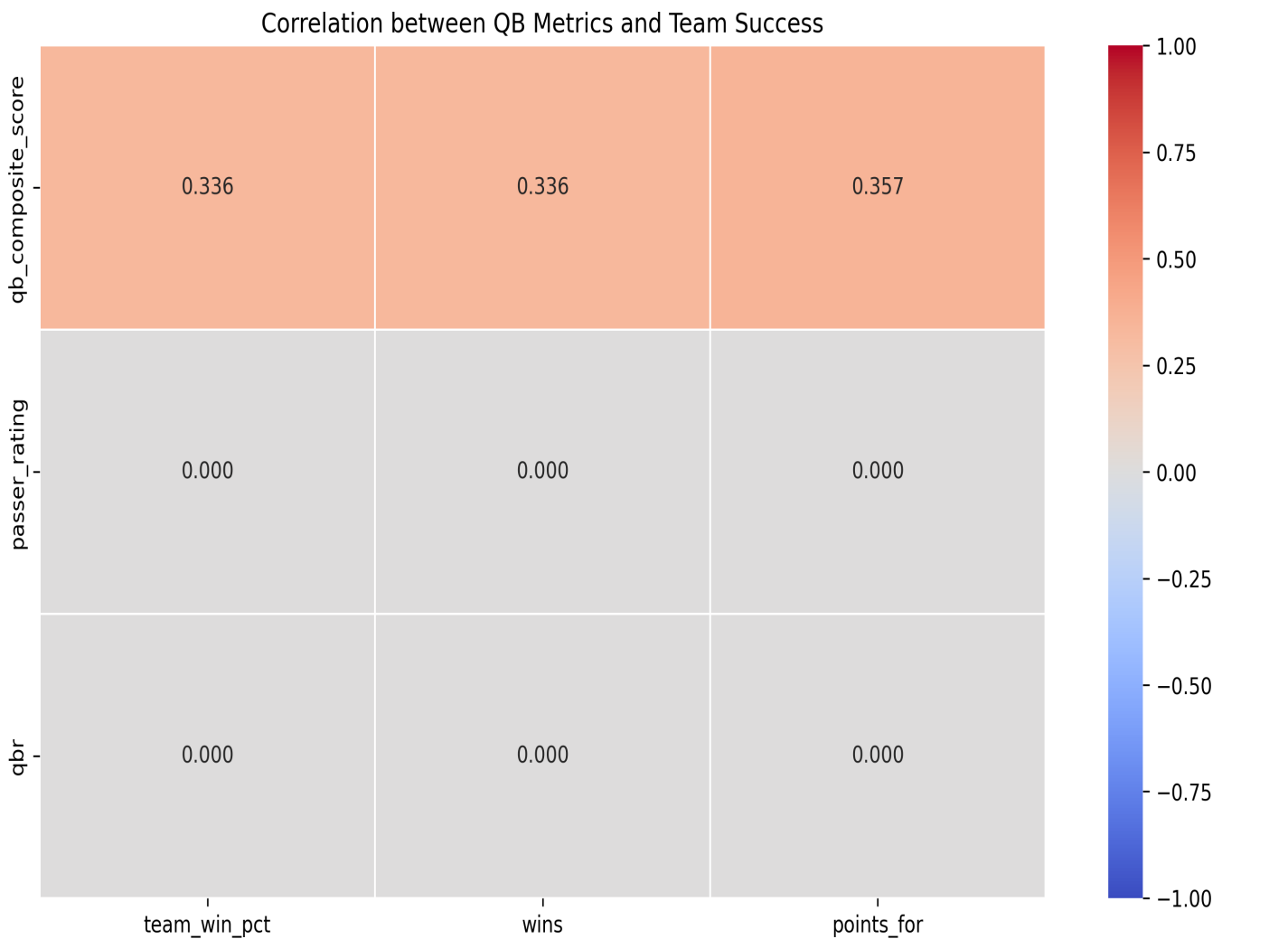
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Metric Correlation Heatmap

The correlation heatmap shows relationships between different performance metrics. This helps identify which aspects of quarterback play are most closely associated with team success.



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Actionable Recommendations

Based on our analysis of quarterback performance during the 2023 NFL season, we offer the following actionable recommendations:

1. Talent Evaluation

- Use our composite QB metric as part of the evaluation process for potential quarterback acquisitions
- Pay special attention to performance under pressure when evaluating quarterbacks behind poor offensive lines
- Consider depth-adjusted completion percentage as a more reliable indicator of accuracy than raw completion percentage
- Don't undervalue mobility contribution, especially for teams with limited receiving options

Implementing these recommendations in talent evaluation processes can help identify undervalued quarterbacks who may outperform expectations when given the right opportunity.

2. Coaching Strategy

- Tailor offensive schemes to quarterback strengths as identified by component metrics
- For quarterbacks with high pressure performance metrics, consider more aggressive passing strategies on obvious passing downs
- Design offensive protection schemes to reduce pressure for quarterbacks who struggle under duress
- For mobile quarterbacks with strong rushing contributions, integrate more designed quarterback runs and option plays

Aligning offensive strategy with quarterback strengths can maximize performance and team success.

3. Team Building

- Balance team investments based on quarterback profile (e.g., stronger O-line for QBs who struggle under pressure)
- For teams with quarterbacks who excel at deep passing, prioritize receivers with downfield speed
- When working with less mobile quarterbacks, ensure adequate protection schemes and quick-release options
- Design complementary rushing attacks that leverage quarterback mobility characteristics

Strategic team building that complements quarterback strengths and mitigates weaknesses will optimize overall team performance.

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Real-Time Pipeline Concept

Implementing a near real-time pipeline for QB performance metrics would provide tremendous competitive advantages. Here's our proposed approach for building this system:

Technical Architecture

The proposed real-time pipeline would consist of the following components:

1. Data Collection Layer
 - API integrations with NFL and third-party data providers
 - Web scraping modules for supplementary data sources
 - Real-time game data feeds for in-game analysis
2. Processing Layer
 - Stream processing framework (Apache Kafka or AWS Kinesis)
 - ETL workflows for data transformation and enrichment
 - Machine learning pipeline for predictive components
3. Storage Layer
 - Time-series database for metric history and trends
 - Document store for unstructured data and analysis
 - In-memory database for real-time query performance
4. Analysis and Visualization Layer
 - Real-time dashboard with key performance indicators
 - Automated alert system for significant metric changes
 - Interactive reporting tools for coaching staff

This architecture would enable near real-time updates of quarterback performance metrics, providing coaches and analysts with immediate insights during games and throughout the season.

Challenges and Mitigation Strategies

Implementing a real-time pipeline presents several challenges:

1. Data Availability and Latency
 - Challenge: Some metrics require data that isn't immediately available after plays
 - Mitigation: Implement a progressive enhancement approach, updating metrics as data becomes available
2. Data Quality Control
 - Challenge: Real-time data can contain errors or inconsistencies
 - Mitigation: Implement automated validation rules and confidence scores for metrics
3. Computational Complexity
 - Challenge: Some complex metrics require significant processing time
 - Mitigation: Use approximate algorithms for real-time and refined calculations post-game
4. Integration with Existing Systems

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- Challenge: Coaches may already use established systems
- Mitigation: Provide APIs and export options for integration with existing tools

By addressing these challenges proactively, we can build a reliable real-time pipeline that delivers actionable quarterback performance insights as games unfold.

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Technical Appendix

This appendix provides additional technical details about the data sources, metric calculations, and analysis methods used in this report.

Data Sources

The analysis utilized the following data sources:

- NFL play-by-play data for the 2023 regular season
- Advanced quarterback metrics from nflfastR and similar projects
- Team performance statistics including wins, losses, and points scored

Data limitations include:

- Subjective elements in pressure classification
- Incomplete tracking data for some games
- Limited sample sizes for some quarterbacks

These limitations were addressed through rigorous data cleaning and appropriate statistical methods.

Metric Calculation Details

The composite QB metric was calculated using the following components and weights:

1. Depth-Adjusted Completion Percentage
 - Raw completion percentages at different depth ranges (behind LOS, short, medium, deep)
 - Weighted by attempt distribution and difficulty
 - Normalized against league averages
2. Pressure Performance
 - Completion percentage differential (under pressure vs. clean pocket)
 - Sack avoidance rate under pressure
 - Positive play percentage when pressured
3. Mobility Contribution
 - Rushing yards, adjusted for situation
 - First down conversion rate on rushes
 - Designed vs. scramble efficiency

These components were normalized on a 0-100 scale and combined with equal weighting to create the final composite metric.

Statistical Methodology

The following statistical methods were employed in the analysis:

- Pearson correlation coefficients for relationship strength assessment
- Significance testing with appropriate p-value thresholds ($p < 0.05$)
- Normalized scaling to facilitate cross-metric comparisons
- Multiple regression analysis to assess component contributions

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All statistical calculations were performed using Python's pandas, numpy, and scipy libraries.