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RESEARCH PLAN — RPC001

Designing a Financial Decision-Making Framework for
Revenue Optimization in Digital Ticketing Platforms

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Executive Summary

This research plan proposes the design and empirical validation of a Financial Decision-Making Framework (FDMF) tailored for revenue optimization in digital ticketing platforms, with a primary focus on the sports and entertainment sector in Saudi Arabia. The study addresses three interconnected problems: the absence of integrated financial decision-making models in digital ticketing operations, persistent suboptimal revenue realization due to static pricing practices, and the lack of context-specific frameworks suited to the unique characteristics of emerging markets such as Saudi Arabia.

Drawing on revenue management theory, multi-criteria financial decision analysis, and platform economics, the study will develop a comprehensive framework that integrates dynamic pricing models, demand forecasting algorithms, and revenue allocation mechanisms. The research employs a mixed-methods design encompassing structured qualitative interviews with senior industry practitioners, quantitative financial simulation modeling using Python and Excel, and expert panel validation.

The significance of this research extends across multiple dimensions: it contributes to a documented gap in academic literature, delivers a practically applicable tool for platform operators, supports the financial sustainability of Saudi Arabia's Vision 2030 entertainment ecosystem, and generates policy-relevant insights for industry regulators. The study is expected to produce four empirically testable hypotheses and a validated FDMF with direct applicability to the Saudi market and comparable emerging economies.

1. Introduction

The rapid digitization of sports and entertainment industries has fundamentally transformed how consumers access and purchase event tickets. Digital ticketing platforms have emerged as critical revenue channels for event organizers, sports leagues, and entertainment companies worldwide. In Saudi Arabia, this transformation is particularly pronounced, driven by the government's Vision 2030 initiative, which has catalyzed unprecedented investment in the sports and entertainment sectors — including the Saudi Pro League and large-scale entertainment events such as Global Village Dammam.

Prior to Vision 2030, Saudi Arabia's entertainment landscape was significantly constrained by regulatory restrictions. Since 2016, the General Entertainment Authority (GEA) has facilitated the launch of cinemas, live concerts, international sporting events, and professional league competitions at scale. This rapid expansion has placed digital ticketing platforms at the intersection of economic growth and operational complexity. The volume, diversity, and velocity of events in the Saudi market have grown exponentially, creating both opportunities for revenue maximization and vulnerabilities arising from inadequate financial management practices.

Despite the growing significance of digital ticketing, many platform operators lack robust, data-driven financial decision-making frameworks tailored to their specific operational realities. Pricing decisions, dynamic demand management, revenue forecasting, and cost optimization are often handled through ad hoc approaches rather than systematic financial models. Industry practitioners consistently report challenges in translating rich operational data — seat utilization rates, purchase lead times, event category performance — into actionable pricing and revenue decisions. This research gap presents both a critical academic opportunity and a practical business need.

This study proposes the design of a comprehensive Financial Decision-Making Framework (FDMF) specifically for revenue optimization in digital ticketing platforms. The framework will integrate financial modeling techniques, dynamic pricing theory, and operations management principles to provide actionable guidance for platform operators seeking to maximize revenue while maintaining operational efficiency and customer satisfaction. The research is grounded in the researcher's direct operational experience within the Saudi ticketing industry, which provides unique access to practitioner perspectives and real-world operational data.

2. Problem Statement

Digital ticketing platforms operating in the sports and entertainment sector face a complex set of financial challenges that are insufficiently addressed by existing management frameworks. The convergence of rapidly growing event volumes, increasingly sophisticated consumer demand patterns, and the absence of structured financial governance creates conditions in which operators are ill-equipped to maximize revenue outcomes. Three core problems drive this research:

2.1 Absence of Integrated Financial Decision-Making Models

Current literature on digital ticketing primarily focuses on technological aspects — such as blockchain-based ticketing and mobile platform design — while largely neglecting the financial decision-making processes that determine platform profitability. Operators lack integrated models that connect pricing strategies, demand forecasting, cost structures, and revenue allocation into a unified decision-support framework. Decisions about pricing tiers, early-bird incentives, capacity releases, and discount strategies are typically made in isolation rather than as part of a coherent financial optimization system.

The absence of integration is especially problematic in multi-event environments where resource allocation decisions across events interact. A pricing decision for a mid-week league match may cannibalize demand for a weekend fixture; an aggressive early-bird promotion may suppress full-price revenues later in the sales cycle. Without an integrated model capable of capturing these interdependencies, operators are unable to optimize across their full portfolio of events.

2.2 Suboptimal Revenue Realization

Empirical evidence from ticketing markets suggests that platforms consistently leave significant revenue on the table due to static pricing models, poor demand segmentation, and inadequate capacity management. In high-growth markets such as Saudi Arabia, where event attendance has increased dramatically since 2018, this suboptimality has material financial consequences for platform operators, event organizers, and the broader entertainment ecosystem.

Research in adjacent industries — notably aviation and hospitality — demonstrates that the adoption of dynamic, demand-responsive pricing can increase revenue per available unit by 10–25% compared to static pricing regimes (Talluri & van Ryzin, 2004). The application of analogous models to digital event ticketing has been limited, leaving a measurable performance gap between current revenue outcomes and theoretically achievable optima. In Saudi Arabia's rapidly expanding market, this gap represents substantial forgone economic value.

2.3 Lack of Context-Specific Frameworks for Emerging Markets

Existing revenue optimization frameworks have been predominantly developed for mature Western markets. They do not adequately account for the unique characteristics of emerging markets such as Saudi Arabia, including distinct consumer behavior patterns, regulatory environments, and the rapid scaling challenges inherent to a market in early exponential growth. Key contextual factors that differentiate the Saudi market include: the influence of the Islamic calendar (Ramadan, Eid periods) on event attendance patterns; the demographic profile of event consumers (predominantly young male nationals); the coexistence of

internationally licensed events with domestically produced entertainment; and the evolving regulatory framework governed by the GEA.

A framework designed exclusively for mature Western markets may misspecify demand elasticities, incorrectly weight operational constraints, or fail to account for the episodic demand patterns characteristic of Saudi Arabia's cultural calendar. The development of a context-sensitive FDMF is therefore both theoretically important and practically necessary.

3. Significance of the Study

This research holds significance on multiple levels, spanning academic, practical, industry, methodological, and policy dimensions:

- **Academic Contribution:** Addresses a documented gap in the intersection of financial management theory and digital platform economics, particularly within the sports and entertainment industry.
- **Practical Relevance:** Provides a directly applicable framework for platform operators in Saudi Arabia and comparable emerging markets, enabling evidence-based financial decision-making.
- **Industry Impact:** Supports the financial sustainability of the broader sports and entertainment ecosystem being developed under Vision 2030, contributing to national economic diversification goals.
- **Methodological Value:** Demonstrates the application of multi-criteria financial modeling in a novel industry context, offering a replicable methodology for future research.
- **Policy Relevance:** Generates insights relevant to regulators and industry bodies seeking to develop standards for digital ticketing market conduct and financial governance.

Beyond these formal dimensions, the research carries particular relevance at this juncture in the development of Saudi Arabia's entertainment economy. The GEA has set ambitious targets for event attendance and economic contribution under Vision 2030, aiming to grow the entertainment sector's contribution to GDP to 6% by 2030 from near-zero in 2015. Meeting these targets requires not only increased event supply but also financially sustainable platform operations that maximize revenue efficiency. This study directly supports that objective by providing operators with the decision-support infrastructure needed to compete at international standards.

4. Research Objectives

4.1 Primary Objectives

1. To design a comprehensive Financial Decision-Making Framework (FDMF) for revenue optimization in digital ticketing platforms.
2. To identify the key financial drivers of revenue performance in digital ticketing operations.
3. To develop and validate dynamic pricing models applicable to event ticketing in emerging markets.

4.2 Secondary Objectives

4. To analyze existing revenue management practices in digital ticketing platforms in Saudi Arabia and comparable markets.
5. To examine the relationship between operational variables (event type, capacity, lead time) and financial outcomes.
6. To provide practical recommendations for platform operators seeking to implement data-driven revenue optimization strategies.

These objectives are designed to be mutually reinforcing. The primary objectives establish the theoretical and design contributions of the study, while the secondary objectives ground the research in empirical reality and ensure the framework's practical applicability. Together, they address both the academic gap and the operational need identified in the problem statement.

5. Research Questions

5.1 Central Research Question

How can a Financial Decision-Making Framework be designed to systematically optimize revenue in digital ticketing platforms operating in emerging markets?

5.2 Subsidiary Research Questions

7. What are the primary financial and operational variables that determine revenue performance in digital ticketing platforms?
8. To what extent do current pricing strategies in digital ticketing platforms align with theoretically optimal dynamic pricing models?
9. What contextual factors specific to the Saudi Arabian market must be incorporated into a revenue optimization framework to ensure its practical applicability?
10. How can financial decision-making frameworks be structured to balance short-term revenue maximization with long-term platform sustainability and customer retention?

The central research question frames the study as a design science inquiry, wherein the objective is not merely to describe or explain existing phenomena, but to produce an artifact — the FDMF — that improves financial decision-making outcomes. The subsidiary questions operationalize this central question by identifying the variables, models, contextual constraints, and trade-offs that must inform the framework's design.

6. Research Hypotheses

The following hypotheses will be empirically tested within this study. They are derived from the theoretical framework and prior literature, and are designed to be falsifiable through the quantitative and qualitative methods described in Section 9.

- H1

Digital ticketing platforms that implement dynamic, demand-responsive pricing models achieve significantly higher revenue per available seat (RevPAS) than those using static pricing structures.
- H2

The adoption of an integrated financial decision-making framework is positively associated with improvement in overall platform profitability.
- H3

Contextual market factors (event category, audience demographics, cultural calendar, and regional economic indicators) significantly moderate the relationship between pricing strategy and revenue outcomes in the Saudi Arabian market.
- H4

There exists a measurable trade-off between short-term revenue maximization strategies and long-term customer lifetime value in digital ticketing platforms.

H1 establishes the core value proposition of dynamic pricing adoption and will be tested through regression analysis of historical sales data. H2 evaluates the framework-level impact of the FDMF and will be assessed through expert panel validation and back-testing simulations. H3 addresses market-specific moderating effects and will be examined through interaction terms in the regression models. H4 explores the intertemporal trade-offs inherent in revenue maximization and will be assessed through customer cohort analysis.

7. Review of Previous Studies

The literature relevant to this study spans three primary domains: (1) revenue management and dynamic pricing, (2) digital platform economics, and (3) financial decision-making frameworks in service industries. A synthesis of findings across these domains reveals both the theoretical foundations available to this research and the gaps that motivate it.

7.1 Revenue Management and Dynamic Pricing

The theoretical foundations of revenue management originate in the airline industry (Littlewood, 1972; Belobaba, 1987) and were subsequently extended to hotel management, car rental, and other perishable-inventory industries. Talluri and van Ryzin (2004) provided the seminal comprehensive treatment of the theory and practice of revenue management, establishing the core principles of demand forecasting, capacity control, and price optimization that remain central to the field.

More recent work has applied these principles to digital contexts, including ride-sharing (Cachon et al., 2017) and online marketplaces (Einav & Levin, 2014). Cachon et al. (2017) demonstrated that surge pricing mechanisms on service platforms improve both supply-side efficiency and overall platform revenue, findings with direct relevance to dynamic ticketing pricing. Einav and Levin (2014) showed that large-scale behavioral data can substantially improve demand forecasting accuracy, a finding that underpins the data-driven dimension of the proposed FDMF.

However, systematic application to live event ticketing remains underdeveloped in the academic literature. The perishable nature of event tickets — where inventory value collapses to zero at the event time — creates a demand and pricing dynamic that differs meaningfully from hotels (which can have repeat inventory across nights) or airlines (which operate fixed schedules with long lead times). Event ticketing is characterized by highly episodic demand spikes, strong social influence effects, and uncertainty about demand magnitude that is only resolved in the weeks immediately preceding the event.

7.2 Digital Platform Economics

Platform economics research, notably Rochet and Tirole (2003) and Parker and Van Alstyne (2005), has established the importance of multi-sided market dynamics in platform pricing. Digital ticketing platforms exhibit characteristics of two-sided markets — connecting event organizers on one side with consumers on the other — and the pricing implications of this structure are not fully addressed in existing ticketing literature.

In two-sided markets, the pricing decision is not simply a bilateral negotiation between platform and consumer but involves simultaneous consideration of the organizer's price sensitivity, the consumer's willingness to pay, and the platform's own fee structure. Rochet and Tirole (2003) show that optimal platform pricing in two-sided markets often departs significantly from standard monopoly pricing, as platforms must manage the interdependence of demand across both sides. This insight has direct implications for the FDMF design, which must incorporate organizer-platform and consumer-platform pricing simultaneously.

Research by Courty (2003) and Leslie and Sorensen (2014) has begun to address secondary market dynamics in event ticketing — specifically the welfare and revenue implications of ticket resale markets. Their findings suggest that primary market pricing inefficiencies create substantial arbitrage opportunities in secondary markets, implying that

improvements in primary market pricing frameworks could simultaneously reduce secondary market price premiums and improve primary market revenues.

7.3 Financial Decision-Making Frameworks

Decision-making framework design has been examined extensively in operations management (Slack et al., 2019) and strategic management (Eisenhardt & Sull, 2001) literature. In financial management, multi-criteria decision-making (MCDM) approaches have been applied to capital allocation and investment decisions (Dyer, 2005). These approaches provide structured methods for evaluating decisions under multiple, potentially conflicting criteria — exactly the challenge faced by digital ticketing operators who must simultaneously optimize for revenue, utilization, customer satisfaction, and organizer relationships.

The application of formal MCDM frameworks to operational revenue decisions in digital service platforms represents a novel contribution that this study aims to develop. Existing financial decision frameworks in service industries (Slack et al., 2019) do not address the real-time, high-frequency nature of ticketing pricing decisions, nor do they incorporate the platform economics dimension that distinguishes digital ticketing from traditional service operations.

7.4 Comparative Market Frameworks

Feature	Airline Industry	Hotel Industry	Digital Ticketing (Current)	Digital Ticketing (Proposed FDMF)
Pricing Model	Dynamic	Dynamic	Static / Semi-dynamic	Fully Dynamic
Demand Forecasting	Advanced	Moderate	Limited	Advanced
Capacity Management	Sophisticated	Moderate	Basic	Sophisticated
Contextual Adjustment	High	Moderate	Low	High
Market Specificity	Global	Local	Generic	Emerging Market
Framework Maturity	Mature	Mature	Nascent	Proposed

The comparative analysis above illustrates the gap between current digital ticketing practices and the state-of-the-art in adjacent industries. The proposed FDMF aims to close this gap by importing proven methodologies from aviation and hospitality revenue management while adapting them to the specific characteristics of the digital ticketing context in emerging markets.

8. Theoretical Framework

This study is grounded in an integration of three theoretical perspectives that collectively provide the conceptual foundations for the proposed Financial Decision-Making Framework. These perspectives are not additive but integrative — each addresses a distinct dimension of the FDMF design challenge, and together they produce a theoretically coherent foundation for the research.

8.1 Revenue Management Theory

Revenue management theory provides the core pricing and capacity optimization logic. The study adopts the demand-based pricing paradigm, wherein prices are dynamically adjusted in response to real-time demand signals, historical patterns, and capacity constraints. The perishable nature of event tickets — where unsold inventory has zero post-event value — makes revenue management theory directly applicable.

Specifically, the study draws on the expected marginal seat revenue (EMSR) model (Belobaba, 1987), which provides a theoretically grounded approach to capacity allocation across pricing tiers. This model will be adapted to accommodate the multi-event environment typical of Saudi Pro League operations, where demand for different fixtures shares consumer pools and marketing resources.

8.2 Financial Decision Theory

Financial decision theory, particularly multi-criteria decision analysis (MCDA), provides the analytical structure for the FDMF. This framework will incorporate financial metrics (revenue, margin, cash flow), operational metrics (seat utilization, lead time), and market metrics (demand elasticity, competitive positioning) into a coherent decision calculus. Dyer's (2005) multi-attribute utility theory (MAUT) provides the formal basis for aggregating these metrics into a unified decision criterion.

The application of MAUT to ticketing decisions requires the specification of attribute weights that reflect the relative importance of revenue, utilization, and long-term customer value. These weights will be elicited from industry practitioners through the expert panel process, ensuring that the framework reflects real-world managerial priorities rather than purely theoretical optima.

8.3 Platform Economics and Value Co-Creation

The platform economics perspective acknowledges the multi-sided nature of digital ticketing platforms and the need to balance value capture (revenue maximization) with value creation for both event organizers and consumers. This perspective ensures the framework accounts for long-term sustainability, not merely short-term revenue optimization.

Drawing on Parker and Van Alstyne (2005), the FDMF will incorporate a two-sided pricing module that explicitly models the interdependence between organizer fees and consumer ticket prices. This module ensures that revenue optimization decisions at the consumer-facing level do not inadvertently undermine organizer relationships — a critical consideration in a market where long-term event supply depends on sustained organizer satisfaction.

9. Saudi Market Context Analysis

Understanding the Saudi Arabian market context is essential to the design of a contextually valid FDMF. This section synthesizes key structural, regulatory, and behavioral characteristics that distinguish the Saudi market from the Western markets for which most existing revenue management frameworks were designed.

9.1 Market Structure and Growth Trajectory

Saudi Arabia's live events market has undergone a structural transformation since 2016. The General Entertainment Authority, established by Royal Decree in 2016, has overseen the licensing of thousands of events annually — from international football matches and Formula E racing to concerts, theatrical productions, and family entertainment centers. Event attendance grew from approximately 5 million visits per year in 2016 to over 70 million by 2022, reflecting compound annual growth of approximately 55%.

This growth trajectory creates both opportunity and operational challenge for digital ticketing platforms. On the demand side, the rapid expansion of the event consumer base — largely first-time event attendees unfamiliar with dynamic pricing norms — creates conditions for significant demand elasticity uncertainty. On the supply side, the pace of new event launches requires platforms to rapidly calibrate pricing models for event categories with limited historical data.

9.2 Cultural and Calendar Effects

The Islamic calendar exerts a significant influence on event attendance patterns in Saudi Arabia. Ramadan — a month of fasting and heightened social activity — typically produces distinct demand patterns characterized by compressed evening event schedules, elevated family attendance, and heightened price sensitivity among budget-constrained consumers. Eid Al-Fitr and Eid Al-Adha create demand spikes for entertainment events as consumers seek celebratory experiences.

These calendar effects are not adequately captured by Western revenue management models, which were designed for markets with secular, linear demand patterns. The FDMF must incorporate calendar-adjusted demand forecasting modules capable of anticipating and pricing for these episodic demand patterns.

9.3 Consumer Behavior and Price Sensitivity

Research on Saudi consumer behavior in the entertainment sector reveals a market characterized by high price sensitivity among mass-market segments, a strong preference for family-group purchases, and significant last-minute buying behavior — particularly among younger male demographic segments. These behavioral patterns have direct implications for dynamic pricing strategy: early-bird pricing incentives may be less effective than in Western markets, while last-minute price reductions may be more demand-stimulating.

Market Factor	Western Markets	Saudi Arabia (Current)	Implication for FDMF
Price Sensitivity	Moderate	High	Conservative ceiling pricing

Purchase Lead Time	Long (weeks)	Short (days)	Late-demand weighting
Calendar Seasonality	Low	Very High	Calendar-adjusted forecasts
Group Purchase Rate	Low	High	Group pricing modules
Dynamic Pricing Acceptance	High	Low–Moderate	Gradual implementation
Secondary Market Activity	High	Emerging	Primary pricing premium

10. Research Methodology

10.1 Research Design

This study adopts a mixed-methods research design, combining quantitative financial modeling with qualitative case analysis. This approach is appropriate given the dual objectives of developing a generalizable theoretical framework and validating it against empirical data from real-world ticketing operations. The mixed-methods design allows the study to leverage the explanatory power of qualitative insights — particularly regarding contextual market factors — while ensuring the rigor and replicability of quantitative modeling.

10.2 Research Phases

Phase 1	Literature Review and Framework Conceptualization Systematic review of academic literature and industry reports to identify best practices and theoretical foundations for the FDMF.
Phase 2	Data Collection Primary data through structured interviews with operations managers at Saudi digital ticketing platforms, supplemented by secondary data from GEA reports and event sales disclosures.
Phase 3	Framework Design and Modeling Development of the FDMF incorporating dynamic pricing models, demand forecasting algorithms, and revenue allocation mechanisms using Excel and Python.
Phase 4	Framework Validation Validation through expert panel review (academic and industry practitioners) and back-testing against historical sales data using Likert-scale questionnaires.
Phase 5	Results Analysis and Recommendations Analysis of validation results, refinement of the framework, and formulation of practical recommendations for industry adoption.

10.3 Sampling

The study will employ purposive sampling for qualitative interviews, targeting senior operations and financial managers at digital ticketing platforms operating in Saudi Arabia with a minimum of two years of operations history. A target sample of 12–18 practitioners is anticipated to achieve theoretical saturation. Participants will be drawn from platforms operating across event categories including sports (Saudi Pro League, AFC Champions League), entertainment (concerts, theatrical events), and family entertainment (theme parks, seasonal events).

For quantitative modeling, secondary datasets from publicly available sources will be utilized, including Saudi General Entertainment Authority annual reports and Vision 2030 sports and entertainment impact assessments.

10.4 Data Analysis

Quantitative data will be analyzed using financial modeling techniques including regression analysis, Monte Carlo simulation, and sensitivity analysis. The regression analysis will test H1 and H3 by examining the relationship between pricing strategy variables and RevPAS outcomes. Monte Carlo simulation will be used to model the distributional properties of revenue outcomes under the FDMF, providing a probabilistic assessment of expected performance improvements.

Qualitative interview data will be analyzed through thematic analysis, with themes mapped to the dimensions of the FDMF under development. NVivo software will be used to support systematic coding and theme extraction.

11. Research Tools and Instruments

- Semi-structured interview guide for qualitative data collection from industry practitioners. The guide will cover current pricing practices, demand forecasting approaches, revenue management challenges, and attitudes toward framework adoption.
- Financial simulation models developed in Microsoft Excel and Python (NumPy, Pandas, SciPy libraries) for quantitative modeling. Python will be used for Monte Carlo simulation and regression analysis; Excel for practitioner-accessible scenario modeling tools.
- Secondary data sources: Saudi General Entertainment Authority (GEA) annual reports, Vision 2030 progress reports, industry databases (Statista, PwC Entertainment & Media Outlook).
- Expert panel validation questionnaire designed on a Likert scale (1–5) to assess framework comprehensiveness, applicability, and practical utility. The panel will comprise both academic experts in revenue management and senior industry practitioners.

The combination of these instruments ensures methodological triangulation — a critical quality criterion in mixed-methods research. Interview data, simulation outputs, and expert panel assessments will be compared and reconciled to produce a validated, multi-perspective assessment of the FDMF's effectiveness and applicability.

12. Scope and Limitations of the Study

12.1 Scope

The study focuses on digital ticketing platforms operating in the live events sector (sports and entertainment) in Saudi Arabia, with a primary focus on the period 2018–2025, corresponding to the accelerated growth phase driven by Vision 2030. The framework design will aim for applicability across comparable emerging markets, including but not limited to other GCC states, North African markets, and South/Southeast Asian markets undergoing similar entertainment sector development.

- Sector: Live events — sports & entertainment — in Saudi Arabia
- Time frame: 2018–2025 (Vision 2030 accelerated growth phase)
- Primary focus: Digital ticketing platforms with documented operational history
- Applicability aim: Framework designed for cross-market use in comparable emerging markets

12.2 Limitations

- **Data Availability:** Financial data from private ticketing operators may be difficult to obtain. The study will rely on publicly disclosed data and anonymized case data shared by research participants.
- **Generalizability:** While the framework is designed with cross-market applicability in mind, findings may have limited direct generalizability to more mature Western ticketing markets with different structural characteristics.
- **Rapidly Evolving Context:** The Saudi entertainment market is evolving rapidly. Some findings may require updating as the market matures beyond the study period.
- **Methodological Tensions:** The study's mixed-methods design may produce tensions between qualitative and quantitative findings that require careful reconciliation.

These limitations are acknowledged but do not fundamentally undermine the study's contribution. The data availability constraint is mitigated by the researcher's direct industry access. The generalizability limitation is addressed through the deliberate framework design for cross-market applicability. The evolving context limitation is inherent to all research in rapidly developing markets and is explicitly acknowledged in the study's scope definition.

13. Research Timeline

Phase	Activities	Duration	Deliverable
Phase 1	Literature review, theoretical framework development, research instrument design	Weeks 1–3	Framework conceptualization report
Phase 2	Practitioner interviews, secondary data collection, data cleaning	Weeks 4–7	Interview transcripts, data sets
Phase 3	FDMF design, financial model construction, Python simulation development	Weeks 8–11	FDMF prototype, simulation models
Phase 4	Expert panel validation, back-testing against historical data	Weeks 12–14	Validation report
Phase 5	Results analysis, framework refinement, recommendations	Weeks 15–17	Final research report

Total estimated research duration: 17 weeks (First Trimester 2026). The timeline is designed to allow iterative refinement between phases, with Phase 3 and Phase 4 operating in partial overlap as early model components are validated before full framework completion.

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