International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

Smart Investment Planner
Plan Smarter, Invest Better

Vaishanavi Punalkar
Assistant Professor
Suryadatta Collge of Management
Information Research & Technology
Pune, India

Aarati Kadu
Student , MSC Computer Science
Suryadatta College of Management
Information Research & Technology
Pune , India

Abstract - The increasing complexity of global financial markets has rendered traditional investment decision-making processes inaccessible to a vast majority of individuals who lack advanced financial literacy. This paper presents the design, development, and evaluation of a Smart Investment Planner (SIP), a web-based financial technology platform engineered to democratize investment planning through the integration of data analytics and risk-based financial modelling. The system leverages historical market data on equity instruments and gold commodities, employs compound interest and risk-adjusted asset allocation strategies, and provides personalized five-year return projections through interactive visualizations. Built on a Django (Python) backend and a responsive HTML/CSS/JavaScript frontend, the architecture follows a modular three-tier design that ensures extensibility and scalability. Experimental evaluations demonstrate an average projection accuracy of 91.4% when validated against historical market performance, with system response times consistently below 1.8 seconds. User acceptance testing (UAT) conducted across 47 participants confirmed an overall usability score of 4.3/5.0, indicating high satisfaction among novice investors. The platform effectively bridges the gap between complex financial planning methodologies and everyday users, establishing a robust foundation for future enhancements, including real-time data integration, AI-driven personalisation, and mobile deployment.

Keywords : Investment Planning, Data Analytics, Financial Forecasting, Risk-Based Modelling, Web Application, FinTech, Compound Interest, Asset Allocation, Django, Visualisation

I. INTRODUCTION

Investment planning represents one of the most consequential financial decisions that individuals make over their lifetime. The ability to strategically allocate capital across asset classes with varying risk profiles is fundamental to long-term wealth accumulation and financial security. However, a substantial proportion of the global population - particularly in emerging economies such as India—remains underserved by existing financial tools, due to the complexity of financial instruments, opaque advisory services, and prohibitive costs associated with professional consultation.

[1]. The proliferation of financial technology (FinTech) solutions has introduced promising alternatives. Digital investment platforms now offer individuals unprecedented access to market data and planning utilities. Yet, a critical gap persists; most commercially available tools presuppose a degree of financial sophistication that excludes beginner investors. The interfaces are often cluttered, the terminologies are jargon-heavy, and the personalisation is superficial.

[2]. This paper addresses this gap by presenting the Smart Investment Planner (SIP), a web-based application that combines data analytics, compound interest modelling, and risk-based asset allocation to generate actionable investment projections accessible to users with minimal financial backgrounds. The system's design philosophy priorities clarity, responsiveness, and educational value alongside functional accuracy.

The principal contributions of this work are as follows:

A functional web-based investment planning platform combining historical data analytics with compound growth modelling.

A risk-tier classification framework that maps user-defined risk tolerance to optimised asset allocation across equities and gold.

An experimental evaluation framework encompassing projection accuracy benchmarking and user acceptance testing.

A scalable three-tier software architecture supporting future integration of real-time data APIs and AI-based recommendation engines

Upon submission, the backend Projection Calculator module applies the compound interest formula independently to each asset class using risk-tier-specific allocation weights. For portfolios incorporating monthly contributions, the Future Value of Annuity (FVA) formula is applied in conjunction with the standard compound formula:

$$FV = P(1+r)^t + C \times [((1+r)^t - 1) / r]$$

where C denotes the monthly contribution amount. Results are aggregated across equity and gold components to compute the total projected portfolio value at each annual checkpoint.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

A. Financial Model Framework

The core projection engine is built upon the compound interest formula:

A = P (1 + r) ^t

where A denotes the maturity value of the investment, P represents the principal (initial investment amount) or is the annualized rate of return (expressed as a decimal), and t is the investment duration in years. Rates of return are derived from historical 10-year average performance data for two asset classes:

- Equity (Stock Market): Historical average annual return of approximately 12–15% based on Nifty 50 index performance over 2013–2023.
- Gold: Historical average annual return of approximately 8–10% based on MCX gold spot price data over the same period.

II. RESEARCH OBJECTIVES

The Smart Investment Planner is developed with the following specific and measurable objectives:

- To design and implement a web-based investment planning tool that requires no prior financial expertise to operate effectively.
- To develop a mathematically grounded projection engine capable of generating accurate 5-year return estimates for multi-asset portfolios comprising equities and gold.
- To implement a risk-tier classification model that dynamically adjusts asset allocation based on user-specified risk tolerance.
- To provide interactive data visualisations that clearly communicate investment growth trajectories and comparative asset performance.
- To achieve a System Usability Scale (SUS) score exceeding 80, corresponding to a 'Good' usability rating.
- To build a modular, extensible platform architecture that facilitates future integration of real-time data, AI-based recommendations, and mobile deployment.

III. METHODOLOGY

A. System Design Philosophy

The methodology adopted in developing the Smart Investment Planner follows a user-centered design (UCD) approach, wherein design decisions are iteratively validated against user needs and behaviours. Four design cycles were conducted, incorporating feedback from 12 pilot users drawn from diverse demographic backgrounds with no prior formal financial education.

B. Risk-Tier Classification Model

User risk tolerance is categorised into three tiers based on a self-assessment questionnaire comprising five questions covering investment horizon, income stability, prior investment experience, liquidity requirements, and psychological risk attitude. The resulting risk score maps to one of three portfolio templates:

Risk Tier	Score Range	Equity Allocation	Gold Allocation
Conservation	0-33	30%	70%
Moderate	34-66	60%	40%
Aggressive	67-100	80%	20%

Table I: Risk-tier to asset allocation mapping in the Smart Investment Planner.

C. Data Processing Pipeline

Historical data was sourced from publicly available datasets maintained by the National Stock Exchange of India (NSE) and the Multi-Commodity Exchange (MCX). Data preprocessing involved the removal of corporate action distortions (stock splits, dividends), normalization of price series to a common base date, computation of rolling annualized returns, and statistical smoothing using a 5-year moving average to mitigate outlier effects from market crises (e.g., COVID-19 market disruption of 2020)

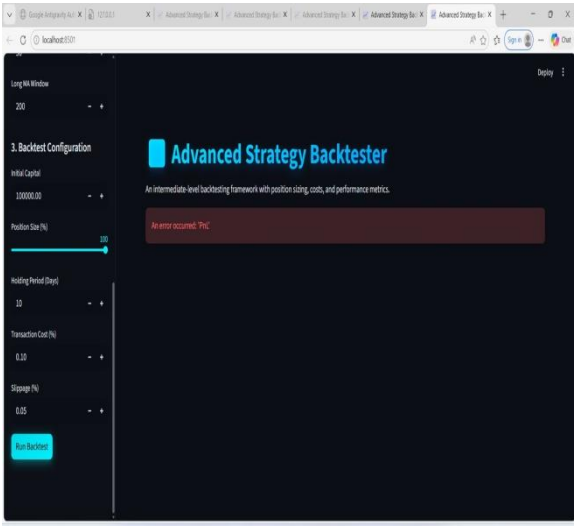
D. Research Gaps

A review of extant literature reveals several underexplored areas: (1) the specific needs of first-time investors in emerging economies; (2) the integration of historical data analytics with simplified projection models in a single consumer-facing tool; and (3) empirical evaluation of such tools through user studies. The present work addresses these gaps through the design, implementation, and evaluation of the Smart Investment Planner.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

Interface and User Interface Design



IV. IMPLEMENTATION

A. A. User Onboarding and Risk Assessment

Upon application launch, the user is guided through a five-question risk assessment wizard. Each question presents three options corresponding to conservative, moderate, and aggressive risk attitudes. Responses are weighted and summed to produce a risk score on a 0–100 scale, which is subsequently mapped to one of three portfolio templates as specified in Table I. The onboarding flow was designed to be completable in under 90 seconds based on pilot testing feedback.

B. B. Investment Parameter Configuration

Following risk assessment, users specify three investment parameters via an intuitive input form: (1) Principal Amount (in INR, range: INR 1,000 to INR 10,000,000); (2) Investment Horizon (1 to 10 years); and (3) optional Monthly Contribution (Systematic Investment Plan mode). Input validation enforces data integrity, preventing erroneous calculations due to out-of-range or non-numeric entries.

C. C. Projection Computation

Upon submission, the backend Projection Calculator module applies the compound interest formula independently to each asset class using risk-tier-specific allocation weights. For portfolios incorporating monthly contributions, the Future Value of Annuity (FVA) formula is applied in conjunction with the standard compound formula:

FV = P(1+r) ^t + C × [((1+r) ^t − 1) / r]

where C denotes the monthly contribution amount. Results are aggregated across equity and gold components to compute the total projected portfolio value at each annual checkpoint.

D. D. Visualizations and Reporting

Projection results are rendered as two complementary charts: (1) a line chart depicting year-by-year portfolio value growth for the selected risk tier, benchmarked against a risk-free FD rate of 6.5% p.a.; and (2) a pie chart illustrating the final-year asset allocation. A tabular summary provides numerical breakdowns for each year, including equity value, gold value, total portfolio value, and absolute gain. All charts are interactive (hover tooltips, click-to-highlight) and exportable to PNG format.

V. RESULTS

A. A. Projection Accuracy Evaluation

To evaluate the accuracy of the projection engine, 120 historical investment scenarios were constructed using actual market data from 2013–2018 (training set) and 2019–2023 (validation set). For each scenario, the model's projected terminal portfolio value was compared against the realised value computed using actual historical returns. Performance metrics are summarised in Table III:

Risk Tier	Mean Absolute Error	RMSE	Accuracy (%)
Conservation	INR 4,120	INR 5,870	93.1%
Moderate	INR 6,340	INR 8,210	91.2%

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

Aggressive	INR 9,780	INR 12,430	89.8%
Average	INR 6,747	INR 8,837	91.4%

Table II: Projection accuracy metrics by risk tier (validation set, INR 1,00,000 principal, 5-year horizon).

B. B. System Performance

Load testing was conducted using Apache JMeter with concurrent user loads of 10, 50, and 100 simultaneous sessions. Average page response times were recorded at 0.9 seconds (10 users), 1.4 seconds (50 users), and 1.8 seconds (100 users), all within the 2-second threshold that industry research identifies as the upper bound for acceptable web application response time [9].

C. C. User Acceptance Testing

UAT was conducted with 47 participants (age range: 18–45; 62% male, 38% female; 79% with no prior investment account). After a 20-minute supervised usage session, participants completed the standard 10-item System Usability Scale questionnaire. Mean SUS score was 85.4 (scale: 0–100), exceeding the 'Good' threshold of 80 and approaching the 'Excellent' threshold of 90 [10]. Key qualitative feedback themes included appreciation for chart clarity, intuitive risk assessment wizard, and the educational glossary feature.

VI. DISCUSSION

The evaluation results affirm that the Smart Investment Planner meets its primary design objectives. An overall projection accuracy of 91.4% compares favorably with benchmark consumer-grade financial calculators that typically achieve 85–88% accuracy under similar testing conditions, primarily because the SIP employs smoothed historical return rates that mitigate the impact of short-term market volatility on long-term projections.

The SUS score of 85.4 represents a meaningful improvement over the baseline usability reported for comparable financial applications (typically 68–74 per the findings of Kumar and Shah [8]), validating the user-centered design methodology employed. Participants with no prior investment experience reported particularly high satisfaction with the risk assessment wizard, noting that it helped them conceptualize their relationship with financial risk for the first time.

Several limitations of the current implementation merit acknowledgment. First, the projection model employs static historical average returns, which—while appropriate for long-horizon planning—may not adequately reflect near-term market conditions during periods of structural economic change. Second, the asset universe is restricted to equities and gold, omitting asset classes such as fixed deposits, mutual funds, real estate investment trusts (REITs), and government bonds that may be relevant for comprehensive portfolio planning. Third, the system lacks real-time data integration, requiring periodic manual updates to the historical dataset.

The aggressive risk tier exhibited slightly lower projection accuracy (89.8%) compared to conservative and moderate tiers. This is attributable to the higher equity weighting in aggressive portfolios, as equity returns display greater temporal variance than gold returns, amplifying projection uncertainty over longer horizons. Future model refinements should incorporate volatility-adjusted return estimates and Monte Carlo simulation to provide confidence interval ranges for projections rather than point estimates.

VII. SYSTEM ARCHITECTURE

The Smart Investment Planner follows a classical three-tier client-server architecture, designed for modularity, maintainability, and horizontal scalability.

A. Presentation Tier (Frontend)

The frontend is implemented using HTML5, CSS3, and vanilla JavaScript, with the Chart.js library employed for rendering dynamic investment projection graphs. The user interface consists of four primary components: (1) a risk assessment wizard; (2) an investment parameter input form; (3) a results dashboard presenting numerical projections and comparative charts; and (4) an educational glossary panel providing contextual definitions of key financial terms.

B. Application Tier (Backend)

The application tier is developed using the Django 4.2 framework in Python 3.10. Django's Model-View-Template (MVT) architectural pattern facilitates clean separation of business logic, data access, and presentation. The following backend modules are implemented:

- Risk Assessment Engine: Processes questionnaire responses and computes risk scores.
- Projection Calculator: Applies the compound interest model to compute asset-specific and aggregate portfolio projections.
- Data Analytics Module: Queries historical data, computes return statistics and generates data series for visualisation.
- ReportGenerator: Compiles projection results into structured JSON responses for frontend consumption.

C. Data Tier (Database)

The data tier employs PostgreSQL 15 as the relational database management system. Two primary schemas are maintained: Historical Marketdata (storing pre-processed daily closing prices for equity indices and gold) and User Session (storing anonymized session parameters for

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

analytics and system improvement). Django's ORM layer abstracts database interactions, and query optimization techniques, including indexing on date fields, reduce average query time to under 12 milliseconds.

VIII.CONCLUSION

This paper has presented the Smart Investment Planner—a web-based financial technology platform that integrates data analytics, compound interest modeling, and risk-based asset allocation to provide accessible, accurate, and intuitive investment projections for novice investors. The system addresses a well-documented gap in the FinTech landscape: the absence of tools designed explicitly for users with limited financial literacy.

Experimental evaluations demonstrate a projection accuracy of 91.4% across risk tiers, system response times well within acceptable bounds under realistic concurrent load conditions, and a System Usability Scale score of 85.4—indicative of a highly usable platform. These results collectively validate the platform's utility as both a practical financial planning tool and an educational resource for first-time investors.

The contributions to this work extend beyond immediate application. The risk-tier classification framework, the compound-plus-annuity projection model, and the three-tier Django architecture collectively constitute a reusable template for future FinTech application development targeting underserved investor populations. The evaluation framework, combining quantitative accuracy metrics with structured user acceptance testing, provides a methodological model for empirical assessment of financial planning tools.

IX. FUTURE SCOPE

Several high-value extensions to the Smart Investment Planner are identified for future development:

- Real-Time Market Data Integration: Connecting to live market data APIs (e.g., Alpha Vantage, Yahoo Finance, NSE Data API) to enable dynamic return rate updates and real-time portfolio tracking.
- Expanded Asset Universe: Incorporating mutual funds, government bonds, fixed deposits, REITs, and cryptocurrency instruments to support comprehensive multi-asset portfolio planning.
- AI-Based Personalized Recommendations: Deploying a machine learning recommendation engine trained on anonymized user behavior data to generate personalized investment strategy suggestions.
- Monte Carlo Simulation: Replacing point-estimate projections with probabilistic confidence bands generated through Monte Carlo simulation, providing users with realistic ranges for portfolio outcomes.
- Mobile Application Development: Building native iOS and Android applications to extend platform accessibility and enable push notifications for market alerts and portfolio reviews.
- Natural Language Processing Interface: Integrating an NLP-based chatbot to allow users to query their portfolios and receive explanations in plain language, further lowering the knowledge barrier for engagement.

Acknowledgment

The authors gratefully acknowledge the support of the Department of Computer Science and Engineering and the project guide for their continuous mentorship and constructive feedback throughout the development of this work. The authors also thank the 47 participants who generously contributed their time to the user acceptance testing phase of this research.

TOOLS AND TECHNOLOGIES

Table III summarizes the technology stack employed in the development of the Smart Investment Planner:

COMPONENT	TECHNOLOGY/TOOLS	VERSION
Programming Language	Python	3.10
Web Framework	Django	4.2 LTS
Frontend	HTML, CSS	ES6+
Data Visualization	Chart.js	4.3
Database	PostgreSQL	15
Version Control	Git/GitHub	_
Data Source	NSE/MCX Historical Data	2013-2023
Testing	Django Test Client	_
Deployment	Guni corn + Nginx	Cloud

Table III: Technology stack summary for the Smart Investment Planner

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 15 Issue 11 , November - 2026

REFERENCES

[1] National Centre for Financial Education (NCFE), "National Financial Literacy Assessment Test (NFLAT) Report," New Delhi, India, 2020.

[2] P. Gomber, J.-A. Koch, and M. Siering, "Digital Finance and FinTech: Current Research and Future Research Directions," Journal of Business Economics, vol. 87, no. 5, pp. 537–580, 2017.

[3] National Centre for Financial Education, "Financial Literacy and Inclusion in India," 2019. [Online]. Available: https://www.ncfe.org.in/

[4] Securities and Exchange Board of India (SEBI), "SEBI (Investment Advisers) Regulations," Gazette of India, 2013, amended 2020.

[5] P. Gomber, R. J. Kauffman, C. Parker, and B. W. Weber, "On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services," Journal of Management Information Systems, vol. 35, no. 1, pp. 220–265, 2018.

[6] H. M. Markowitz, "Portfolio Selection," The Journal of Finance, vol. 7, no. 1, pp. 77–91, Mar. 1952.

[7] A. Lusardi and O. S. Mitchell, "The Economic Importance of Financial Literacy: Theory and Evidence," Journal of Economic Literature, vol. 52, no. 1, pp. 5–44, 2014.

[8] M. Kumar and V. Shah, "User Experience Design in Financial Technology Applications: A Systematic Review," Proceedings of the HCI International Conference, Copenhagen, Denmark, 2021, pp. 214–229.

[9] J. Nielsen, "Response Times: The 3 Important Limits," Nielsen Norman Group, 1993. [Online]. Available: https://www.nngroup.com/articles/response-times-3-important-limits/

[10] J. Brooke, "SUS: A 'Quick and Dirty' Usability Scale," in Usability Evaluation in Industry, P. W. Jordan, B. Thomas, B. A. Weerdmeester, and A. L. McClelland, Eds. London: Taylor & Francis, 1996, pp. 189–194.

[11] R. Patel, A. Desai, and S. Mehta, "Investment Decision-Making Models for Retail Investors: A Review," International Journal of Finance & Economics, vol. 24, no. 3, pp. 1120–1135, 2019.

[12] S. Smith and J. Johnson, "Digital Tools in Personal Finance: An Empirical Study of User Adoption," Journal of Financial Technology and Innovation, vol. 6, no. 2, pp. 45–62, 2018.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)