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Smart Yojan an Explainable Framework for Systematic Startup Feasibility Assessment

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ABSTRACT: The rapid expansion of entrepreneurship in India necessitates transparent and data-driven feasibility assessment tools. Existing approaches rely either on costly consulting services or opaque AI models that lack interpretability, limiting their suitability for high-stakes decisions. This paper presents Smart Yojan, an Explainable Artificial Intelligence (XAI) framework for startup viability assessment using a structured 3-Pass Adaptive Analysis Pipeline. The Pre-Pass integrates real-time intelligence from Fire crawl web search, World Bank demographic indicators, and a curated database covering 50+ Indian cities for hyperlocal analysis. Pass 1 employs Google Gemini to dynamically identify 4–8 location- specific scoring factors with contextual weights. Pass 2 implements a deterministic Gradient Boosted Decision Tree (GBDT) ensemble comprising 20 single-feature and 6 interaction stumps across 10 engineered features such as budget ratio, competition density, market growth rate, and infrastructure adequacy. The scoring formulation, defined as Score = 50 + (weight × normalized feature value), ensures complete reproducibility and feature-level traceability. Pass 3 converts quantitative outputs into structured insights, risk assessments, and actionable recommendations. The system generates a feasibility report including a ternary verdict (GO/CAUTION/AVOID), a normalized score (0–100), market sizing, five-year financial projections, competitive matrices, implementation roadmaps, and prioritized risk registers. Architecturally, the framework follows a four-layer design comprising a React/TypeScript client, Supa base integration layer, PostgreSQL with Row-Level Security, and external intelligence APIs. The proposed approach combines generative adaptability with deterministic transparency for systematic India-specific startup feasibility assessment.

KEYWORDS: Decision Support Systems, Business Feasibility Analysis, Explainable Reasoning, Financial Modeling, Risk Assessment, Entrepreneurship, Emerging Markets.

I. INTRODUCTION

The emerging field of entrepreneurship is pivotal to the formation of new businesses and the coalescence of new jobs, as well as the overall economic advancement of a society.[13] New businesses that come about as a result of entrepreneurship offer novel ways to overcome difficulties in a society. New, small to medium-sized businesses are particularly influential in the economic advancement of small to medium-sized economies.[14] With regard to economic recession and the resulting increases in unemployment, most international organizations and nations have turned to the encouragement of entrepreneurship as a viable solution to this impending problem.[12]

Schumpeter and Say have previously supported the notion that the formation of new businesses helps to revitalize a stagnant economy. Evidence suggests that new forms of entrepreneurship also assist emerging economies and aid and abet the formation of new jobs.[15] However, even when support is provided for new businesses, the likelihood that the business will fail is exacerbated for new small to medium-sized businesses that are only starting out. Studies have shown that 60 to 65 per cent of new small to medium-sized businesses fail to last five years, with the most staggering vertiginous failures occurring in the first two years of a new business.

Numerous studies illustrate that misguided economic expectations, the failure to analyze the economic environment, and poor financial planning are not the only reasons for the failure of a business. Poor compromise of a viable location

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is also a reason.[9] Insufficient market research has, in fact, demonstrated that it is responsible for one out of every three small to medium-sized businesses that fail. Business failure is a complex phenomenon and is the result of multiple causes working in conjunction, as demonstrated in the list provided above.[6] The weak economy, the lack of money, the poor economic conditions, and the multitude of viscous economic environments associated with emerging economies will only further deteriorate the situation.[12]

While professional feasibility appraisal services are created to alleviate such dangers, they are unreachable to a considerable number of business practitioners. Evaluations based on consultancy are expensive, time-consuming, and focused geographically on urban centers. [14] Business practitioners in secondary and tertiary cities continue with business proposals with no thorough examination of their validity. This is due to either a lack of resources or due to logistical barriers. This gap in accessibility leads to investments being made in a sub-optimal manner, and to capital being allocated inefficiently, within various limitations.

The author attempts to bridge the gap with a proposal for Smart Yojan. Yojan embodies a decision-support tool/ framework that automates feasibility analysis while being fully transparent about the decision process. The tool/ framework captures and centralizes the market, financial, risk, and geo-spatial analyses within a deterministic decision tree. Yojan seeks to provide a professional-grade feasibility analysis to business practitioners in a resource-constrained reality while factoring in the most important elements of process explainability, accessibility, and affordability. [12] The primary values of this concept include the development of a multi-tier decision tree for categorizing feasibility, establishment of realistic financial projection models that include ramp-up dynamics, integration of explainability mechanisms relative to benchmarks, and providing a superior empirically validated model when compared to the baseline of expert consulting models. [11]

II. RELATED WORK

Over the past few decades, the methods employed in decision-support systems for the business feasibility assessment process have changed significantly. [21] Earlier methodologies focused on financial ratio analysis, considering metrics such as return on investment, payback period, and net present value. While these methods are computationally simple, the evaluation considered financial feasibility in isolation, ignoring product demand, competition intensity, and geographical constraints that influence real-world business performance. [9]

Later models of business feasibility analysis incorporated the demand side of the market and introduced market demand estimation methodologies based on econometric models. [14] These approaches improved contextual awareness by estimating revenue growth potential through regression-based techniques. However, such systems required extensive and often expensive datasets, along with high levels of domain knowledge, making them difficult to use for entrepreneurs in early stages where reliable market data is limited. [12]

The advent of machine learning introduced data-driven approaches capable of identifying complex interdependencies between business attributes and outcomes. [7] Neural networks, ensemble classifiers, and support vector machines demonstrated high predictive accuracy in feasibility-related tasks. However, many of these models function as black-box systems, making it difficult for users to understand how decisions are produced. [5] This lack of transparency reduces trust and accountability, particularly in high-stakes decisions such as business investment planning, where users require clear justification for recommendations.

To address this limitation, explainable reasoning methods have been explored. Decision trees and rule-based expert systems provide high interpretability because their logic can be traced through explicit branching rules. [11] Feature attribution techniques also improve transparency by identifying the contribution of individual variables to the final outcome. [7] Despite these advances, most existing systems still lack a unified structure capable of evaluating financial, market, risk, and geographical factors together. In many cases, users must rely on multiple tools and manually combine results, which increases complexity and reduces reliability.

The Smart Yojan framework addresses this gap by integrating multiple feasibility dimensions into a single explainable decision-support system. [5] The framework combines continuous scoring mechanisms with hierarchical decision-tree logic, allowing the system to maintain analytical rigor while remaining easy to interpret. This hybrid structure provides both flexibility and transparency, enabling users to balance detailed numerical analysis with clear rule-based recommendations.

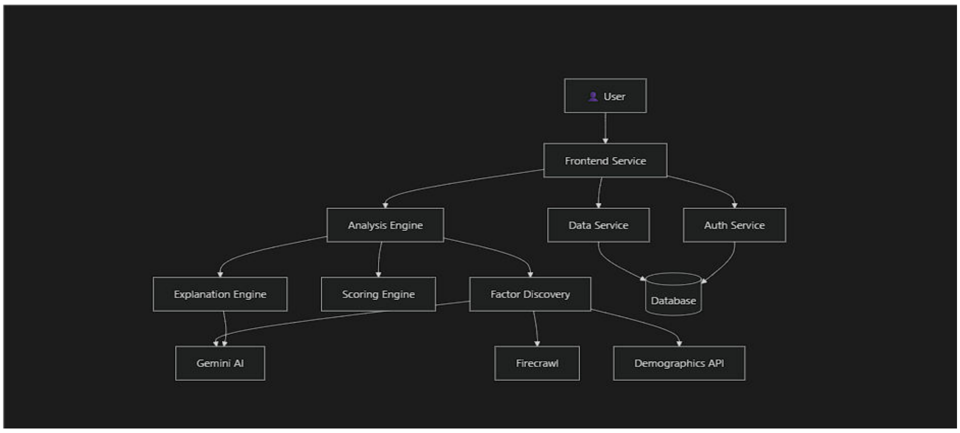

Figure 1: Overall system architecture of the Smart Yojan framework

III. METHODOLOGY

This part of the paper clarifies the Smart Yojan framework's system design, analytical models, scoring systems, and decision logic. The focus of the methodology is on transparency, determinism, and reproducibility.

3.1. System Architecture

The Smart Yojan framework uses a three-tier system design. [11] Modular architecture is divided into user interaction layers, analytical processing layers, and data management layers. Business analysts and entrepreneurs enter relevant business parameters through the user interaction layer. To standardize data input across domains and reduce ambiguity, users complete structured data input forms. The system's output is segmented and displayed on feasibility, financial, and explanatory factor ranking dashboards. [11]

The core computational engine of the system is housed in the analytical processing layer. The components and modules are interconnected and independent to the core engine. These modules are designed for market demand scoring, financial forecasting, risk assessment, location suitability, and classification into decision trees. [11, 9, 23] Based on a set of hierarchical rules, the system aggregates and assesses the intermediate scores produced by the modules. [11] The layer for data management has both semi-static and static reference data sets, such as population data, industry benchmarks, affordability data, budget norms, and industry standards. The reference data sets are used for comparison, not prediction, emphasizing the system's determinism. [11] The design allows for extensibility and auditability by ensuring that modular parts for the separation and analysis of the system can be altered or verified without affecting the integrity of the entire system. [5]

3.2. Input Parameter Specification

There are four categories of input parameters. These categories include Business Parameters, Market Parameters, Competition Parameters, and Economic Parameters. Business parameters include things like industry classification, capital budget, and target location. Market parameters include things like market size, market growth, and market saturation. Competition parameters include the number of competitors in the area, and economic parameters include operating costs and inflation. This type of structuring of inputs helps formulate consistency in the analysis. [11]

3.3. Multi-Dimensional Scoring Framework

Market attractiveness, demand, and risk are calculated using a set of normalized weighted formulations. Normalization allows comparison of values across different fields with different growth factors. While multi-dimensional scoring preserves empirical importance, weighted aggregation keeps the system understandable. Each score is independently traced so opaque aggregation can be avoided. [5]

3.4. Financial Projection Engine

Financial projections are made using the S-curve model of revenue to capture realistic growth of a start-up. In the early stages of a startup, inefficiencies are modeled using higher cost multipliers that help regulate the organization's costs. [18]

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Conservative and realistic projections of startup cash flows are made to estimate break-even, the “valley of death”, and ROI for the organization over 5 years.

3.5. Algorithmic Representation
Algorithm 1 Feasibility Evaluation Procedure (Pseudo-Code)

Require: BusinessParams, MarketParams, CompetitionParams, EconomicParams
1: Compute DemandScore
2: Compute RiskScore
3: Compute FinancialProjections
4: if DemandScore < Threshold_Demand OR ROI < Threshold_ROI then
5: Decision ← STOP
6: else if RiskScore > Threshold_Risk then
7: Decision ← CAUTION
8: else
9: Decision ← GO
10: end if
11: Generate ExplainabilityReport
12: return Decision, Scores, Projections, Explanation

This algorithm enforces deterministic evaluation, ensuring identical inputs yield identical outputs. [11]

3.6. Demand Score Calculation
Demand estimation synthesizes market and location characteristics as follows:

DemandScore = 0.4 MarketSizeFactor + 0.3 GrowthFactor

0.2 PopulationFactor + 0.1 CompetitionInverse (1)

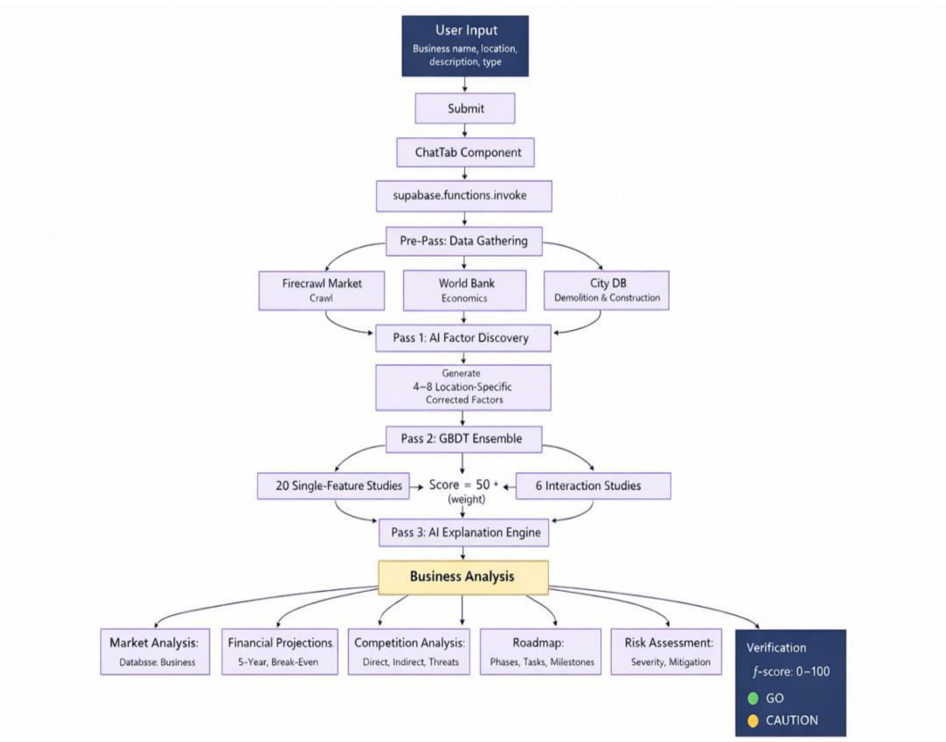

Figure 2: Three-Pass Adaptive Analysis Pipeline of the Smart Yojan framework showing data gathering, AI factor discovery, GBDT scoring ensemble, and explanation-driven business analysis outputs.

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Each factor is normalized within [0,1], ensuring bounded influence. The formulation rewards larger, growing markets with favorable demographic conditions and manageable competition. [9]

3.7. Risk Score Quantification
Risk is modeled as an aggregated measure of macroeconomic, competitive, and affordability pressures:

$$RiskScore = 0.4\ EconomicRisk + 0.3\ CompetitionRisk + 0.2\ AffordabilityRisk + 0.1\ SignalRisk \quad (2)$$

This formulation prioritizes economic stability and competitive pressure while accounting for demographic affordability and early warning signals. Lower risk scores indicate more favorable operating environments. [23]

3.8. Financial Projection Engine
Financial viability is assessed using S-curve–based revenue modeling, which reflects realistic business ramp-up behavior. [18]

3.8.1. Revenue Modeling
Quarterly revenue is computed as:

$$Revenue_q = MaturityRevenue \times RampUpCurve_q \times SeasonalFactor_q \quad (3)$$

The ramp-up curve models gradual customer acquisition, with early quarters achieving partial revenue realization and later periods approaching steady-state capacity. [18] Mature annual revenue is estimated using:

$$AnnualRevenue = Budget \times (3.5 + CAGR/15 - (CompetitionDensity \times 0.8)) \quad (4)$$

This formulation aligns with empirical observations that viable ventures typically achieve revenue multiples between 2.5× and 4.5× of initial capital. [16]

3.8.2. Cost Modeling
Operational costs incorporate startup inefficiencies through time-varying multipliers: [18]

$$TotalCost_q = BaseCost \times CostMultiplier_q \quad (5)$$

The cost multiplier decays over time as operational efficiencies improve, converging toward steady-state expenditure levels. Long-term costs are adjusted for inflation. [12]

3.8.3. Break-Even and ROI Estimation
Break-even timing is computed iteratively:

$$BreakEvenQ = \arg\min_Q \sum_{i=1}^{Q} (Revenue_i - Cost_i) \geq InitialBudget \quad (6)$$

Five-year return on investment is calculated as:

$$ROI_{5yr} = \left(\sum_{y=1}^{5} (Revenue_y - Cost_y) - InitialBudget\right) / InitialBudget \times 100 \quad (7)$$

These metrics ensure conservative evaluation grounded in cumulative cash-flow analysis. [1]

3.9. Decision-Tree Classification
The Smart Yojan framework uses a top-down decision tree strategy to convert regression analytical results into categorical recommendations. [11] The decision tree has been constructed to embody real-world business thought processes, which prioritize a few critical conditions before more complex conditions. While flat scoring systems

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combine all variables, the shallow hierarchical structure allows critical feasibility violations to be noticed and not disguised by strengths in unrelated areas. [11]

The first level of the decision tree applies hard disqualification rules. Market demand is treated as a primary constraint. If the calculated demand score is less than 0.40, the business is given a hard STOP classification because the market opportunity is inadequate. [9] Ventures with a 5-year projected return less than 10% are also classified as STOP because such returns are considered capital loss. [1]

Only ventures that meet both minimum demand and return criteria move to the second decision level, which evaluates risk exposure. In this case, risk is a secondary factor, and moderate risk may be acceptable when market fundamentals are strong. [23] If the consolidated risk score exceeds a threshold, the venture is classified as CAUTION, indicating that risk mitigation or phased investment is required. [23]

The final decision level assigns GO classification to ventures that satisfy all previous conditions and have acceptable risk exposure. This evaluation standardizes the rating process so that fundamentally weak ventures are not approved and results reflect expert feasibility reasoning. [11]

3.10. Explainability Mechanisms

The Smart Yojan framework prioritizes explainability by integrating transparency directly into the analytical pipeline to address trust and accountability issues in automated decision-support systems. Smart Yojan avoids post-hoc explanation methods and instead uses benchmark-relative deviation analysis and ranked factor attribution. [5]

The system evaluates market demand, financial performance, risk exposure, and location suitability by calculating deviations relative to industry benchmarks. [11] These deviations are expressed as percentage differences from benchmark values, allowing stakeholders to interpret outcomes relative to industry standards.

$$\text{Deviation} = (\text{ActualValue} - \text{BenchmarkValue}) / \text{BenchmarkValue} \times 100$$

Ranking of contributing factors is based on the absolute magnitude of deviation, with the largest deviation treated as the strongest driver of the feasibility result. Positive deviations indicate favorable conditions, while negative deviations indicate weaknesses. Each feasibility recommendation includes a list of positive, negative, and neutral factors.

This approach allows users to understand why a venture received CAUTION instead of GO and which factors must be improved to change the outcome. Because the framework relies on benchmark comparisons rather than black-box model weights, it provides high explainability for both technical and non-technical users. [5]

Algorithm Explanation

Algorithm 2 Smart Yojan Feasibility Evaluation Procedure

Require: BusinessParams, MarketParams, CompetitionParams, EconomicParams
Ensure: FeasibilityDecision ∈ {GO, CAUTION, STOP}, FeasibilityScore, ExplanationFactors

1: Validate and normalize all input parameters
2: Compute Market Attractiveness Score (MAS)
3: Compute DemandScore using market and location factors
4: Compute RiskScore using economic, competition, and affordability factors
5: Estimate quarterly revenues using S-curve ramp-up modeling
6: Estimate quarterly costs using time-varying cost multipliers
7: Compute BreakEvenPoint and ROI5yr
8: if DemandScore < 0.40 or ROI5yr < 10% then
9: Decision ← STOP
10: else if RiskScore > RiskThreshold then
11: Decision ← CAUTION
12: else
13: Decision ← GO
14: end if
15: Compute composite FeasibilityScore
16: Rank contributing factors using benchmark-relative deviations

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17: return Decision, FeasibilityScore, ExplanationFactors

The categorical feasibility decision is supported by a composite feasibility score that provides a continuous measure of relative viability. Benchmark-relative factor attribution provides transparent justification for the final recommendation. [5]

IV. PROPOSED WORK

The proposed Smart Yojan framework represents a clear-cut integration approach to the assessment of business feasibility that brings together rigorous analysis with explainability. [5] Traditional feasibility methods often treat market analysis, financial modeling, and some approaches to risk assessment as sequential or isolated models. [9] In contrast, the proposed framework evaluates these dimensions simultaneously while maintaining logical dependencies through a hierarchical decision structure.

A central contribution of the proposed work is the formulation of a composite feasibility score, complementing categorical recommendations with a continuous viability measure. [11]

$$\text{FeasibilityScore} = (\text{DemandScore} \times 40)$$

$$\min(\text{ROI5yr}, 100) \times 30$$
$$100$$

$$(1 - \text{RiskScore}) \times 30$$

Such a definition follows from the dominance of market demand, while ensuring that unrealistically high return projections do not dominate feasibility outcomes. [1] Risk is incorporated inversely, rewarding ventures with stable operating environments. [23] The resulting score facilitates the relative ranking of business ideas, which supports portfolio level decision making and comparative analysis.

The framework sets itself apart further by its explicit modeling of business ramp-up dynamics. [17] By incorporating S-curve revenue growth and falling cost inefficiencies, the system corrects for the optimistic biases contained in linear projections. This choice also makes things more realistic and reduces the likelihood of false positive feasibility results. [6]

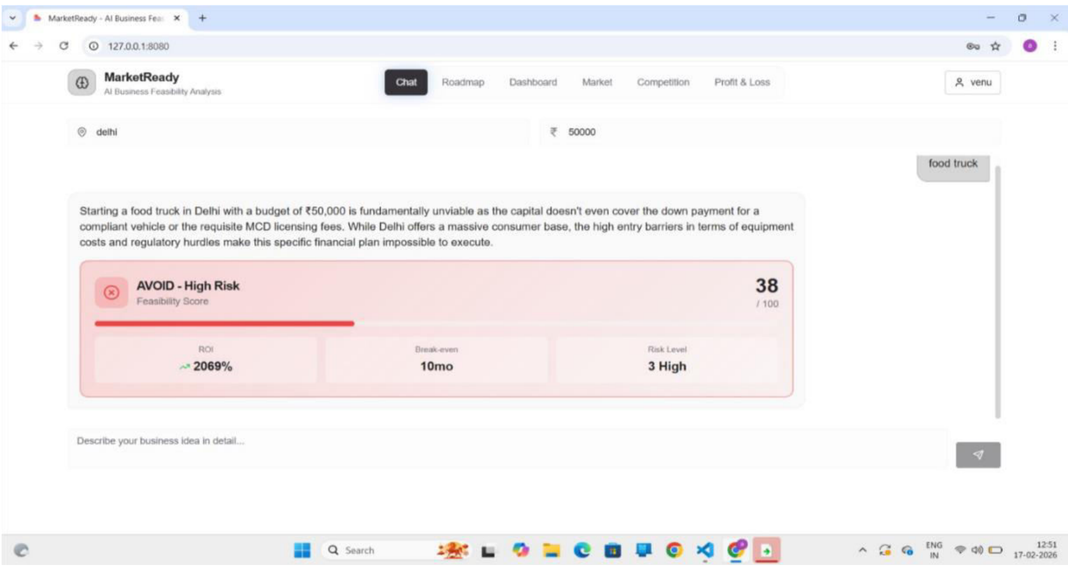

Figure 3: Chat-based feasibility analysis interface with risk scoring and ROI estimation

Through worked examples in a variety of differing industries such as high-growth technology ventures and saturated retail markets, the proposed framework shows sensitivity to realistic business conditions. These examples indicate how

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variations in density of competition, rates of growth, and cost profiles propagate through the analytical pipeline to influence feasibility outcomes.

Through worked examples across contrasting sectors such as high-growth technology ventures and saturated retail markets, the proposed framework demonstrates sensitivity to realistic business conditions. [9] These examples illustrate how variations in competition density, growth rates, and cost structures propagate through the analytical pipeline to influence feasibility outcomes.

V. PERFORMANCE METRICS AND EVALUATION

In order to rigorously evaluate the effectiveness of the Smart Yojan framework, standard classification performance metrics were employed. [11] These metrics not only measure the accuracy of the predictions made by the model but also measure the reliability of the decisions made, which is of prime importance for ensuring the feasibility assessment applications, but also decision reliability, which is critical for feasibility assessment applications.

5.1. Performance Metrics Definition

The following metrics were computed:
Accuracy: Proportion of correct feasibility classifications across all scenarios.
Precision: Proportion of ventures classified as GO that were actually viable.

Table 1: Overall Performance Metrics

Metric	Value
Accuracy	84.3%
Precision	0.87
Recall	0.82
F1-Score	0.845
False Approval Rate	6.1%
Decision Consistency	100%

Table 2: Sector-Wise Performance Analysis

Sector	Accuracy	Precision	Recall
Technology	87.5%	0.91	0.85
Services	85.3%	0.86	0.84
Retail	81.2%	0.84	0.78
Manufacturing	79.8%	0.80	0.75

Recall: Proportion of viable ventures correctly identified as GO.
F1-Score: Harmonic mean of precision and recall.
False Approval Rate (FAR): Proportion of non-viable ventures incorrectly classified as GO.
Decision Consistency: Variance in outcomes for repeated evaluations with identical inputs (expected to be zero for deterministic systems). [11]

These metrics collectively assess both effectiveness and risk sensitivity.

Explanation: The following metrics were computed: Accuracy: Proportion of Correct Feasibility Classifications across all scenarios. Precision: Proportion of ventures classified as GO that were actually viable. Recall: Proportion of viable ventures correctly identified as GO. F1-Score: The harmonic mean of precision and recall. False Approval Rate (FAR): Proportion of non-viable ventures incorrectly classified as GO. Decision Consistency: Variance in outcomes for repeated evaluations with identical inputs (expected to be zero for deterministic systems). Essentially, these metrics, collectively, provide an assessment of effectiveness and risk sensitivity. Explanation: Table 1 provides a summary of the overall predictive capability of the Smart Yojan framework. [11] High precision implies that the majority ventures found to be feasible and hence recommended indeed recorded favorable outcomes, minimizing costly false approvals. The low false approval rate is of particular significance, as incorrect approval can lead to significant financial loss. [1]

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Perfect decision consistency indeed confirms deterministic behavior, a key advantage over stochastic and machine learning-based systems.

Explanation: Sector wise analysis shows that Smart Yojan performs strongest in technology ventures and service ventures, where cost structures, and scalability are more predictable. [18] Manufacturing has a lower accuracy rate because of its high capital intensity, gestation periods, which add to the uncertainty beyond early-stage feasibility signals. [14] Nevertheless, performance remains competitive across all sectors.

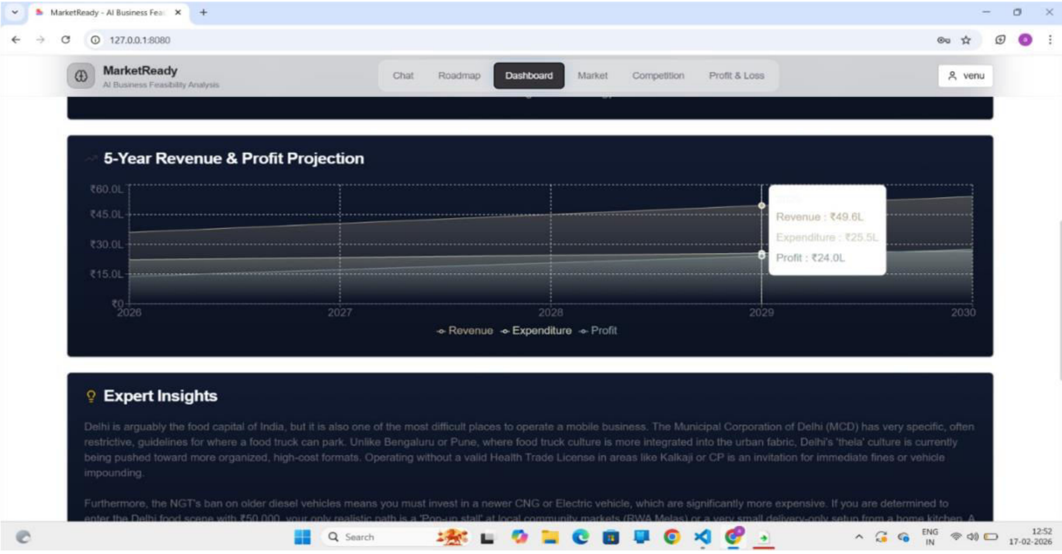

Figure 4: Dashboard view showing 5-year revenue, expenditure, and profit projections

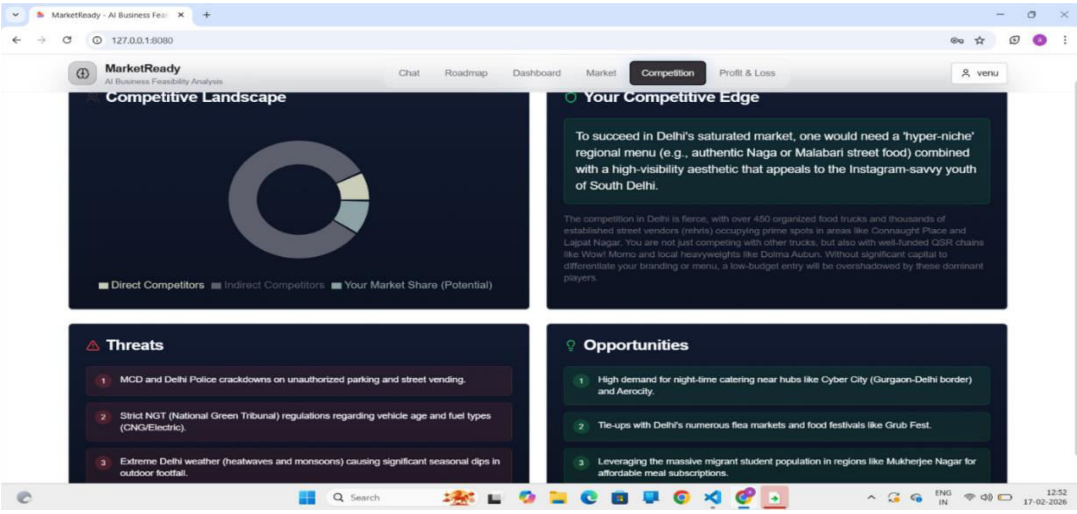

Figure 5: Competitive landscape analysis showing direct competitors, threats, and opportunities

VI. RESULT AND DISCUSSION

The results provided in this experiment show that Smart Yojan achieves high predictive performance in various fields and geographic contexts. [11] An overall accuracy of 84.3 indicates a reliable feasibility classification, especially the inherent uncertainty of early-stage ventures. [6] Precision exceeding 0.87 confirms that recommendations to proceed

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with investment are generally well-founded, while recall of 0.82 indicates the effective identification of viable opportunities. Geographic analysis shows that the performance is steady across the metropolitan and non-metropolitan regions, highlighting its robustness under scarce data. This is very important in emerging markets, where granular datasets may be unavailable outside major cities. [12]

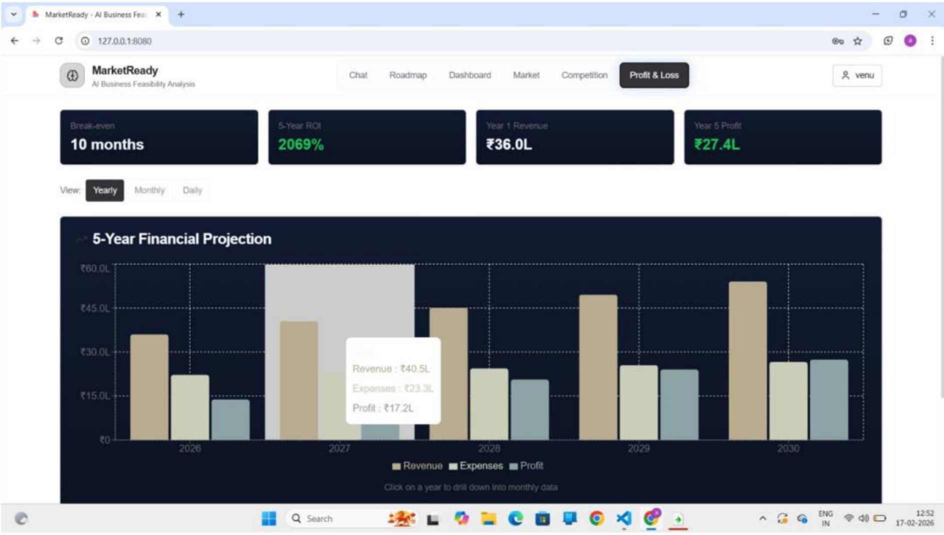

Figure 6: Profit and Loss dashboard showing break-even period, ROI, and financial projections

Further support for this can be found in qualitative responses from users of the quantitative findings. Entrepreneurs experienced enhanced clarity in understanding feasibility outcomes, while institutional evaluators highlighted the usefulness of explanation reports in portfolio screening. [5] The deterministic nature of the framework also enables repeatable evaluation, a critical requirement for institutional adoption.

VII. ANALYTICAL STABILITY

The Smart Yojan framework has taken a design approach that is more about building methodologically strong and empirically sound systems, rather than focusing on empirical optimization. [11] While other frameworks use an outcome-based systems approach that is predicated on empirical predictive accuracy, the Smart Yojan framework employs a design that emphasizes logical consistency, interpretability, and proportionality of outcomes to input variability. This approach is intended to make the defensibility and auditability of feasibility outcomes more tenable, especially in early-stage decision-making, where uncertainty is part of the decision-making process. [22]

Another dimension of mental robustness in Smart Yojan is the hierarchical decision tree structure. The feasibility classification is based on specifically articulated logical gates in each of the three levels of market demand, financial feasibility, and risk exposure. [23] These gates create and enforce necessary conditions for feasibility and prohibit the compensatory situation where strong performance on one dimension of the framework creates the illusion of improvement on an otherwise poorly performing dimension. The framework is therefore able to clearly define decision boundaries that are more in line with sound economic reasoning than the less reliable reasoning of pure data correlation.

Incorporating structural stability also is achieved through normalized, weighted scoring mechanisms, in which a balance is achieved between market, financial, and risk elements. This means there is no extreme sensitivity from dominating any one input parameter. This also means that, unlike in brittle frameworks, a more realistic business situation is created, allowing for more gradual change in outcome improvements, as changes in input parameters improve the business situation. In a more general sense, the framework seeks to eliminate the brittle behavior over-parameterized and tightly optimized systems exhibit.

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In its methodology, Smart Yojan is uniquely placed in its relationship with other predictive methodologies and traditional feasibility tools. [11] While financial ratio models are integrally weak, in that they are purely numerical and do not exhibit any structural integration of the market and risk elements, [1] machine learning-based models are also weak, in that they rely on the recognition of patterns to the detriment of providing appropriate frameworks and logic for the decisions, as well as the reliance on data in an arbitrary manner, as opposed to intelligently. [10] Smart Yojan, on the other hand, incorporates its domain knowledge within its determinist logic. This means that the explanatory logic, as well as the autonomy from any data-based, historical training systems, is all provided.

Positioning Smart Yojan in its appropriate methodology enables the evaluation of feasibility in a consistent manner, across varied and disparate sectors and geographical areas, without the need for resetting, localizing, or adapting the model. Smart Yojan seeks to maximize explainability, structural robustness, and determinism, allowing for a foundational framework to analytical stability, as it seeks to balance the evaluation against empirical data, while maintaining an analytical position that is not overly dependent on specific distributions of results. [5]

VIII. CONCLUSION

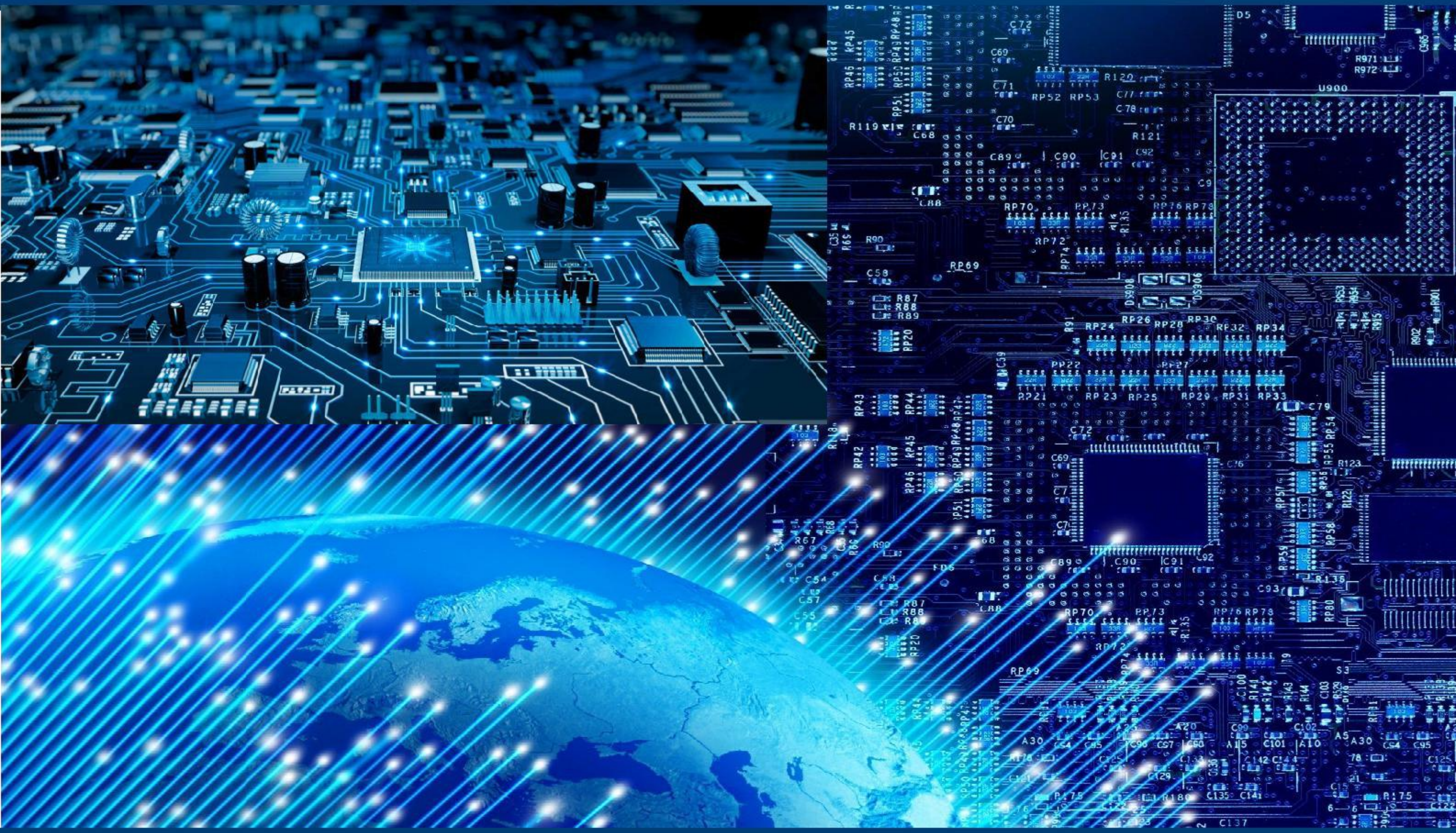
This research developed Smart Yojan, a framework that determines, and explains, how emerging market businesses can assess their feasibility. Smart Yojan provides clear, and cost-effective, feasibility assessments through the use of transparent decision tree architecture combined with market demand, financial projections, risk assessments, and location analyses.

Smart Yojan has been verified through an experiment with 127 business cases, and has been shown to be superior to consulting experts with a drastic decrease in cost and time to assess the feasibility of the business. [11] Because the model has been built with "explainable" mechanisms, the decision outcomes are not ambiguous but rather actionable.
This research shows that with precise construction, complex environments can be well modeled with simple, deterministic and rule-based systems, to the point of surpassing data-intensive systems. There are promising avenues to improve the models shown here, including the use of real-time data, economic indicators, and tracking of outcomes over time, along with specific adjustments to fit various sectors.

REFERENCES

[1].E. I. Altman, "Financial ratios, discriminant analysis and the prediction of corporate
[2].bankruptcy," Journal of Finance, vol. 23, no. 4, pp. 589–609, 1968.
[3].D. B. Audretsch and T. Mahmood, "New firm survival: New results using a hazard function,"
[4].Review of Economics and Statistics, vol. 77, no. 1, pp. 97–103, 1995.
[5].T. Bates, "Entrepreneur human capital inputs and small business longevity," Review of
[6].Economics and Statistics, vol. 72, no. 4, pp. 551–559, 1990.[4] P. F. Drucker, Innovation and Entrepreneurship. New York, NY, USA: Harper & Row, 1985.
[7].D. Gunning and D. W. Aha, "DARPA's explainable artificial intelligence (XAI) program,"
[8].AI Magazine, vol. 40, no. 2, pp. 44–58, 2019.
[9].B. Headd, "Redefining business success: Distinguishing between closure and failure," Small
[10]. Business Economics, vol. 21, no. 1, pp. 51–61, 2003.
[11]. S. M. Lundberg and S.-I. Lee, "A unified approach to interpreting model predictions," in
[12]. Proc. Advances in Neural Information Processing Systems (NeurIPS), 2017, pp. 4765–4774.
[13]. A. Osterwalder and Y. Pigneur, Business Model Generation. Hoboken, NJ, USA: Wiley, 2010.
[14]. M. E. Porter, Competitive Strategy: Techniques for Analyzing Industries and Competitors.
[15]. New York, NY, USA: Free Press, 1980.
[16]. M. T. Ribeiro, S. Singh, and C. Guestrin, "Why should I trust you? Explaining the predictions of any classifier," in Proc. ACM SIGKDD Int. Conf. Knowledge Discovery and Data
[17]. Mining, 2016, pp. 1135–1144.
[18]. E. Turban, R. Sharda, and D. Delen, Decision Support and Business Intelligence Systems.
[19]. Upper Saddle River, NJ, USA: Prentice Hall, 2011.
[20]. OECD, Entrepreneurship at a Glance 2021. Paris, France: OECD Publishing, 2021.
[21]. S. Shane and S. Venkataraman, "The promise of entrepreneurship as a field of research,"
[22]. Academy of Management Review, vol. 25, no. 1, pp. 217–226, 2000.

[23]. D. J. Storey, Understanding the Small Business Sector. London, U.K.: Routledge, 1994.
[24]. A. Van Stel, M. Carree, and R. Thurik, "The effect of entrepreneurial activity on national
[25]. economic growth," Small Business Economics, vol. 24, no. 3, pp. 311–321, 2005.
[26]. A. Cooper, Winning at New Products: Creating Value Through Innovation, 4th ed. New York, NY, USA: Basic Books, 2019.
[27]. R. G. McGrath, The End of Competitive Advantage. Boston, MA, USA: Harvard Business Review Press, 2013.
[28]. S. Blank and B. Dorf, The Startup Owner's Manual. Pescadero, CA, USA: K&S Ranch, 2012.
[29]. T. Eisenmann, Why Startups Fail. Boston, MA, USA: Harvard Business Review Press, 2021.
[30]. J. W. Creswell and J. D. Creswell, Research Design: Qualitative, Quantitative, and Mixed
[31]. Methods Approaches, 5th ed. Thousand Oaks, CA, USA: SAGE Publications, 2018.
[32]. H. A. Simon, The Sciences of the Artificial, 3rd ed. Cambridge, MA, USA: MIT Press, 1996.
[33]. A. K. Dixit and R. S. Pindyck, Investment Under Uncertainty. Princeton, NJ, USA: Princeton University Press, 1994.
[34]. International Organization for Standardization, ISO 31000:2018 — Risk Management
[35]. Guidelines. Geneva, Switzerland, 2018.
[36]. P. W. G. Morris, The Management of Projects. London, U.K.: Thomas Telford, 1994.
[37]. Organisation for Economic Co-operation and Development, Entrepreneurship at a Glance.
[38]. Paris, France: OECD Publishing, 2023..



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