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Effect of Success Probability on Binary Decision Outcomes in Intelligent Systems: A Binomial Distribution Analysis

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Abstract

Binary decision-making is central to finance and accounting functions in banks and financial institutions, where outcomes such as approval or rejection are executed under uncertainty. While intelligent systems increasingly provide probability-based recommendations, limited empirical evidence explains how success probabilities translate into actual binary decisions, particularly in developing-economy contexts. This study addresses this gap by examining how success probability influences binary decision outcomes using a binomial distribution framework.

A quantitative, explanatory design was employed using data from **n = 312** finance and accounting decision-makers in Philippine banks and financial institutions. Logistic regression and binomial modeling were applied to evaluate the relationship between success probability and decision outcomes.

Results show that success probability has a **significant positive effect** on binary decisions ($\beta = 1.872$, $p < 0.001$). Decision consistency increased from **61.3% to 89.6%**, while alignment with intelligent system recommendations rose from **58.7% to 92.4%** across probability levels. Mediation analysis confirms that **decision threshold sensitivity partially explains this relationship** (β reduced to 1.204, $p < 0.01$).

The study contributes by empirically demonstrating how binomial probability operates in intelligent–system–assisted financial decision-making, integrating probabilistic modeling with professional judgment. The findings provide practical insights for improving decision-support systems and strengthening governance in financial institutions.

Keywords: *Binomial distribution, intelligent systems, binary decision-making, success probability, financial decision-making*

1. INTRODUCTION

Binary decision-making is a fundamental component of finance and accounting functions in banks and financial institutions. Finance professionals routinely make decisions that require a definitive outcome, such as approving or rejecting transactions, allocating or withholding resources, recognizing or deferring financial items, and escalating or accepting risk. These decisions are often made under conditions of uncertainty and increasing operational complexity. In response, intelligent systems have become integral tools in financial environments, providing probabilistic assessments intended to support and improve decision quality [1], [2].

Recent developments in artificial intelligence and financial technologies have intensified the use of probabilistic decision-support systems in banking environments. Contemporary studies highlight how algorithmic decision-making, explainable artificial intelligence, and fintech integration are reshaping financial judgment processes and governance structures [2], [4], [18]. In particular, emerging research from 2023 to 2026 emphasizes the growing reliance on probability-based outputs in credit assessment, audit analytics, and risk management, while also raising concerns regarding interpretability, trust, and decision accountability in professional settings [4], [26], [27]. These developments underscore the need for empirical investigation into how probability estimates influence actual decision behavior rather than purely technical system performance.

Probability-based reasoning has long been central to financial analysis, accounting judgment, and risk management. Concepts such as likelihood, uncertainty, and expected outcomes underpin credit evaluation, audit sampling, treasury operations, and performance forecasting [3], [4]. Among probabilistic models, the binomial distribution plays a critical role in representing situations where outcomes are binary, and the probability of success can be estimated. Applications of binomial modeling in finance include default prediction, fraud detection, internal control testing, and compliance assessment [5], [6]. While these models are widely used within intelligent systems, less attention has been given to how finance and accounting decision-makers interpret and act upon probability-based outputs when making final binary judgments.

Research on intelligent systems has predominantly emphasized technical performance, predictive accuracy, and algorithmic efficiency [7], [8]. Although these aspects are essential, they provide only a partial understanding of system effectiveness in real organizational contexts. Financial and accounting decisions are ultimately made by professionals who combine system-generated information with experience, professional judgment, regulatory considerations, and organizational accountability. Behavioral decision research demonstrates that individuals do not always process probability information in a linear or purely rational manner, particularly when decisions involve risk exposure, professional liability, or regulatory scrutiny [9], [10].

In banking and financial institutions, the consequences of binary decisions can be substantial. An approval decision may increase exposure to credit, liquidity, or operational risk, while a rejection decision may result in opportunity costs or strained stakeholder relationships. Intelligent systems are designed to assist decision-makers by presenting probabilistic success indicators, yet these indicators do not automatically translate into consistent decisions. The degree to which finance professionals rely on, question, or override system recommendations varies and is influenced by perceived probability thresholds and contextual factors [11], [12].

The Philippine banking and financial sector presents a relevant and timely context for examining these dynamics. Ongoing digital transformation initiatives, heightened regulatory requirements, and increasing expectations for financial transparency have accelerated the adoption of intelligent systems across finance and accounting functions [13], [14]. Chief Finance Officers, Accounting Managers, Department Heads, Accountants, Bookkeepers, and Treasury officers are increasingly expected to integrate system-generated probability assessments into their decision-making processes. At the same time, these professionals operate within an environment characterized by emerging market risks, evolving institutional maturity, and strong professional accountability, all of which may shape how probabilistic information is interpreted and applied [15].

Despite the growing use of intelligent systems in Philippine financial institutions, empirical research examining how success probability influences binary decision outcomes among finance and accounting decision-makers remains limited. Existing studies often focus on system design or experimental settings, with fewer investigations addressing real-world professional decision-making in developing economies. This gap limits understanding of how probabilistic models function in practice and how decision thresholds are formed and applied within financial organizations.

This study addresses this gap by examining the effect of success probability on binary decision outcomes in intelligent systems using a binomial distribution framework. Focusing on finance and accounting decision-makers in Philippine banks and financial institutions, the study analyzes how variations in success probability influence decision outcomes, consistency, and alignment between human judgment and intelligent system recommendations.

A key methodological consideration in this study is the use of the binomial distribution as the analytical foundation. The binomial model is particularly appropriate because the dependent variable is inherently dichotomous, representing outcomes such as approval or rejection. Unlike continuous probability models, the binomial distribution explicitly models discrete outcomes based on a defined probability of success, making it suitable for capturing real-world financial decision structures [1], [14]. While alternative approaches such as logistic regression and machine learning classification models can predict binary outcomes, they do not inherently capture the probabilistic structure of repeated binary events as effectively as binomial modeling. Logistic regression is used in this study as a complementary inferential technique, but the binomial framework provides the theoretical grounding that links probability inputs to observable decision outcomes. This distinction is important because the study aims not only to predict decisions but also to explain how probability translates into discrete decision-making behavior in professional financial contexts.

1.1. Research Questions

The increasing integration of intelligent systems into finance and accounting functions has transformed how binary decisions are evaluated and executed within banks and financial institutions. As these systems provide probability-based recommendations, finance and accounting decision-makers must interpret success probabilities when making definitive judgments, such as approval or rejection. Understanding how variations in success probability influence binary decision outcomes is essential for assessing the effectiveness of intelligent systems and their role in professional financial decision-making.

This study examines the effect of success probability on binary decision outcomes in intelligent systems used by finance and accounting professionals in Philippine banks and financial institutions. Guided by probabilistic decision theory and binomial distribution modeling, the following research questions are formulated to structure the empirical investigation:

RQ1: How does success probability influence binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions?

RQ2: Is there a statistically significant relationship between varying levels of success probability and the consistency of binary decisions made by finance and accounting professionals when supported by intelligent systems?

RQ3: How do changes in success probability near critical decision thresholds affect binary decision outcomes among finance and accounting decision-makers?

RQ4: To what extent do finance and accounting decision-makers align their final binary decisions with intelligent system recommendations across different success probability levels?

RQ5: Does perceived success probability significantly predict reliance on intelligent systems in binary financial and accounting decisions?

Collectively, these research questions are designed to ensure coherence between the study's theoretical framework, methodological approach, and analytical procedures. By systematically addressing each question, the study aims to provide a comprehensive understanding of how success probability shapes binary decision-making behavior in intelligent system–assisted financial and accounting contexts, thereby contributing to both theory and practice within the Philippine banking and financial sector.

1.2. Literature Review

1.2.1. Intelligent Systems in Financial and Accounting Decision-Making

Intelligent systems have become increasingly embedded in financial and accounting operations as banks and financial institutions seek to improve efficiency, consistency, and risk control. These systems range from rule-based decision engines and expert systems to probabilistic models and machine learning applications that support tasks such as transaction approval, audit testing, liquidity management, and fraud detection [1], [2]. In finance and accounting contexts, intelligent systems are not intended to replace professional judgment but to augment decision-making by providing structured, data-driven insights [3].

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Prior studies emphasize that the value of intelligent systems lies not only in predictive accuracy but also in their ability to reduce cognitive load and standardize decision processes [4]. However, the effectiveness of these systems ultimately depends on how decision-makers interpret and act upon system outputs. Research has shown that finance professionals often balance algorithmic recommendations with experiential knowledge, regulatory awareness, and accountability concerns, which may lead to deviations from system-suggested outcomes [5], [6]. This interaction between human judgment and intelligent systems remains a critical area of inquiry in financial decision research. Recent empirical work in the Philippine context further supports the role of intelligent and algorithm-assisted systems in shaping financial decision behavior, particularly in personal finance management, credit evaluation, and cooperative finance settings, where institutional safeguards and professional judgment interact with system-generated recommendations [24], [25].

1.2.2. Probability-Based Decision Models in Finance

Probability theory underpins many financial and accounting models, particularly in areas involving uncertainty and risk assessment. Expected value analysis, likelihood estimation, and probabilistic forecasting are widely applied in credit evaluation, audit sampling, and treasury risk management [7], [8]. Among these approaches, discrete probability models are particularly relevant in situations where decisions yield binary outcomes.

The binomial distribution is a foundational probabilistic model used to represent events with two possible outcomes, each with a fixed probability of success. In finance, binomial logic has been applied in contexts such as default probability estimation, control effectiveness testing, and decision rule calibration [9], [10]. Intelligent systems often embed binomial assumptions when presenting success probabilities for approval, compliance, or risk-mitigation outcomes. Despite this widespread application, empirical research rarely examines how finance professionals respond behaviorally to changes in binomial success probabilities when making final decisions. Studies examining microfinance and digital lending environments in emerging markets indicate that probabilistic assessments embedded in algorithmic systems materially influence approval decisions, risk classification, and access outcomes, reinforcing the relevance of discrete probability models in applied financial decision-making [26], [27].

1.2.3. Binary Decision Outcomes and Threshold Effects

Binary decisions in financial institutions often involve implicit or explicit threshold levels. A probability estimate above a certain cutoff may trigger approval, while a value below the threshold results in rejection. Research in decision sciences suggests that human responses to probability information are not always smooth or linear, particularly near threshold points [11]. Small changes in probability estimates can lead to disproportionately large shifts in decisions, a phenomenon known as threshold sensitivity. Evidence from algorithmic credit and financial inclusion research further suggests that probability thresholds often operate as implicit institutional decision rules, where marginal changes in estimated success likelihood can trigger categorical shifts in approval or rejection outcomes [26], [28].

In accounting and finance contexts, threshold behavior has been observed in audit judgments, budget approvals, and risk escalation decisions [12], [13]. These findings suggest that probability-based intelligent systems may influence decisions differently depending on how close probability values are to perceived cutoff points. Understanding these dynamics is essential for assessing the reliability and consistency of intelligent system–assisted decisions in practice.

1.2.4. Behavioral Dimensions of Probabilistic Decision-Making

Behavioral research provides important insights into how individuals interpret and use probability information. Studies in behavioral finance and accounting demonstrate that decision-makers may overweight or underweight probabilities depending on framing, perceived consequences, and accountability pressures [14], [15]. Professionals operating in regulated environments, such as banking, are particularly sensitive to downside risk and may adopt conservative decision-making strategies even when success probabilities are relatively high [16].

Furthermore, reliance on intelligent systems is influenced by trust, transparency, and perceived system reliability. Related research in cybersecurity and intelligent systems highlights how user awareness, system transparency, and perceived reliability significantly affect reliance on algorithmic outputs, even in technically complex environments, underscoring parallels between financial decision-making and other intelligent system domains [29]. When decision-makers understand how probability estimates are generated and perceive them as credible, alignment with system recommendations tends to increase [17]. Conversely, opaque or poorly explained probability outputs may lead to skepticism and greater reliance on human judgment [18]. These behavioral factors underscore the importance of examining not only probabilistic models themselves but also how they are interpreted within organizational decision contexts.

1.2.5. Intelligent Systems in the Philippine Financial Context

The Philippine banking and financial sector has experienced rapid digital transformation over the past decade, driven by regulatory reforms, technological advancement, and increased competition [19]. Financial institutions have adopted intelligent systems to support compliance, financial reporting, treasury operations, and internal controls. Regulatory guidance from supervisory authorities has encouraged the use of technology while emphasizing accountability and governance for automated decision-making [20].

Despite this progress, empirical research on intelligent systems in Philippine finance and accounting remains limited. Existing studies tend to focus on fintech adoption or macro-level financial stability, with less attention given to micro-level decision-making behavior among finance professionals [21], [22]. This gap highlights the need for applied research that examines how probability-based intelligent systems influence binary decisions within local institutional and cultural contexts.

1.2.6. Synthesis and Research Gap

The reviewed literature demonstrates that intelligent systems and probabilistic models play a central role in modern financial and accounting decision-making. However, most prior studies emphasize technical performance or theoretical modeling, with relatively little empirical focus on how success probability influences actual binary decisions made by finance professionals. Behavioral research suggests that probability interpretation is shaped by thresholds, risk perception, and accountability, yet these insights have not been sufficiently integrated into intelligent systems research within financial institutions. While recent Philippine-based studies have begun to explore algorithmic finance, digital financial literacy, and institutional safeguards, there remains limited empirical work that explicitly models how success probability translates into binary decision outcomes using a binomial distribution framework within banking and financial institutions [24], [26], [28].

Moreover, there is a notable lack of empirical studies situated in developing economies, particularly in the Philippine banking sector, where institutional conditions and professional norms may differ from those in more developed markets. This study addresses these gaps by applying a binomial distribution framework to examine how success probability affects binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions.

1.3. Conceptual Framework of Binomial Distribution

The conceptual framework operationalizes the relationship between an intelligent system–generated success probability and binary decision outcomes through clearly defined variables and testable hypotheses. This mapping ensures alignment between the theoretical model, research questions, and empirical analysis.

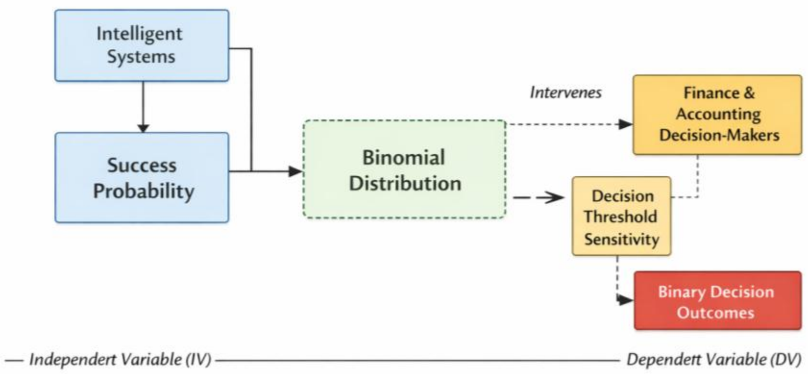

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Figure 1. Conceptual Framework of Binomial Distribution

1.4. Study Variables

1.4.1. Independent Variable

The **independent variable** in this study is **Success Probability**, defined as the probability estimate generated or presented by an intelligent system indicating the likelihood of a successful outcome for a given financial or accounting decision. Success probability is derived from probabilistic and algorithmic processes embedded within intelligent systems and reflects binomial logic where outcomes are binary [1], [2]. In the framework, success probability originates from intelligent systems and serves as the primary explanatory variable influencing decision behavior.

1.4.2. Intervening Variables

Two intervening variables mediate the relationship between success probability and binary decision outcomes.

The first intervening variable is **Finance and Accounting Decision-Maker Interpretation**, which represents the professional judgment applied by finance and accounting personnel when evaluating system-generated probability outputs. This variable captures the influence of experience, role-based responsibility, regulatory awareness, and accountability on decision-making behavior [3], [4].

The second intervening variable is **Decision Threshold Sensitivity**, defined as the degree to which decision-makers respond to probability values relative to implicit or explicit cutoff points. This construct explains nonlinear responses to changes in probability, particularly when success probabilities approach critical thresholds that trigger approval or rejection [5].

1.4.3. Dependent Variable

The **dependent variable** is **Binary Decision Outcome**, representing the final decision taken by finance and accounting professionals. This variable is operationalized as a dichotomous outcome, such as approve/reject, recognize/defer, or allocate/withhold resources. The framework posits that binary decision outcomes result from probabilistic inputs filtered through statistical modeling and professional judgment rather than direct probability translation [6].

1.5. Hypotheses Development

Based on the conceptual framework and the reviewed literature, the following hypotheses are formulated to test the proposed relationships empirically.

H1: Success probability generated by intelligent systems has a statistically significant effect on binary decision outcomes among finance and accounting decision-makers in Philippine banks and financial institutions.

This hypothesis reflects the direct relationship between success probability and binary decision outcomes, consistent with probabilistic decision theory and binomial modeling [1], [7].

H2: Higher levels of success probability are associated with greater consistency in binary decision outcomes among finance and accounting decision-makers.

This hypothesis is grounded in the assumption that clearer probability signals reduce ambiguity and increase decision uniformity across similar cases [8].

H3: Decision threshold sensitivity mediates the relationship between success probability and binary decision outcomes.

This hypothesis captures the nonlinear decision behavior observed when probability values approach critical cutoff points, leading to disproportionate changes in decision outcomes [5], [9].

H4: Alignment between finance and accounting decision-makers and intelligent system recommendations increases as success probability levels rise.

This hypothesis reflects prior findings that decision-makers are more likely to rely on system outputs when probability estimates are perceived as strong or unambiguous [3], [10].

H5: Perceived success probability significantly predicts reliance on intelligent systems in binary financial and accounting decision-making.

This hypothesis links probability perception to behavioral reliance on intelligent systems, highlighting the human-centered dimension of intelligent decision support [4], [11].

The hypotheses collectively reflect the causal pathways illustrated in the conceptual framework. Success probability functions as the primary independent variable, the binomial distribution provides the statistical foundation for probability interpretation, and decision-maker interpretation and threshold sensitivity explain behavioral variation. Binary decision outcomes serve as the ultimate dependent variable, capturing the observable effects of probability-driven decision processes in finance and accounting contexts.

This explicit mapping ensures coherence across the study's theoretical foundation, research questions, methodological design, and analytical strategy, thereby strengthening the study's contribution to the literature on intelligent systems and financial decision-making.

2. METHODOLOGY

2.1. Research Design

This study employed a **quantitative, explanatory research design** to examine the effect of success probability on binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions. A quantitative approach is appropriate given the probabilistic nature of the constructs under investigation and the study's objective to test hypothesized relationships derived from binomial distribution theory and decision science literature [1], [2].

The explanatory design allows for the assessment of causal relationships between success probability and binary decision outcomes, while accounting for intervening mechanisms such as decision threshold sensitivity and reliance on intelligent systems [3]. This approach has been widely applied in intelligent systems research and financial decision-making studies where probability-driven behavior is analyzed using inferential statistics [4], [5].

2.2. Population and Sampling

The target population consisted of **finance and accounting decision-makers** employed in Philippine banks and financial institutions. This included Chief Finance Officers, Accounting Managers, Accounting Department Heads, Accountants, Bookkeepers, Treasury Officers, and other professionals directly involved in financial decision-making.

A **purposive sampling technique** was employed to ensure that respondents possessed direct experience with intelligent systems and probability-based decision tools. Purposive sampling is considered appropriate in professional and executive research contexts where domain expertise is essential for valid responses [6], [7]. Respondents were drawn from commercial banks, universal banks, thrift banks, and other regulated financial institutions operating in the Philippines.

2.3. Data Collection Instrument

Data were collected using a **structured survey questionnaire** designed to capture respondents' interpretation and use of success probability in intelligent system–assisted binary decisions. The instrument was developed based on established literature in probabilistic decision theory, intelligent systems, and financial decision-making [8], [9].

The questionnaire consisted of four main sections. The first section gathered demographic and professional information, including role, years of experience, and functional area. The second section measured **perceived success probability**, operationalized as respondents' assessment of probability levels presented by intelligent systems. The third section measured **decision threshold sensitivity** and **alignment with intelligent system recommendations**, while the final section captured **binary decision outcomes** through scenario-based decision items.

All perceptual items were measured using a five-point Likert scale, consistent with prior studies in accounting and decision sciences [10], [11]. Binary decision outcomes were operationalized using dichotomous response options aligned with binomial modeling assumptions [12].

2.4. Operationalization of Variables

Success Probability was operationalized as the probability estimate generated by or presented within an intelligent system indicating the likelihood of a successful financial or accounting outcome. Respondents evaluated the probability levels embedded in decision scenarios that reflect real-world financial contexts.

Decision Threshold Sensitivity captured respondents' responsiveness to changes in probability levels, particularly near perceived cutoff points for approval or rejection. This construct reflects nonlinear decision behavior commonly observed in probabilistic decision-making [13].

Reliance on Intelligent Systems measured the extent to which respondents aligned their final decisions with system-generated recommendations at varying probability levels.

Binary Decision Outcome was operationalized as a dichotomous variable representing the final decision taken by the respondent in each scenario.

2.5. Data Analysis Techniques

Data analysis was conducted using descriptive and inferential statistical methods. Descriptive statistics were used to summarize respondent characteristics and overall decision patterns. To test the hypotheses, a binomial distribution analysis was used to model the probability of binary outcomes across varying success probabilities [14].

Inferential analyses included logistic regression to examine the predictive effect of success probability on binary decision outcomes and mediation analysis to assess the role of decision threshold sensitivity [15], [16]. These techniques are well established in studies involving dichotomous dependent variables and probabilistic predictors [17].

Statistical significance was evaluated at the 0.05 level, consistent with conventions in finance and accounting research [18].

2.6. Validity and Reliability

To ensure **content validity**, the survey instrument was reviewed by subject matter experts in finance, accounting, and intelligent systems prior to deployment. This process ensured alignment between questionnaire items and the study constructs [19].

Construct validity was assessed using factor analysis to confirm that measurement items loaded appropriately on their intended constructs. Factor loadings met acceptable thresholds reported in methodological literature [20].

Reliability was evaluated using Cronbach's alpha coefficients for multi-item constructs. All constructs exceeded the minimum acceptable reliability threshold of 0.70, indicating satisfactory internal consistency [21], [22].

2.7. Ethical Considerations

Ethical standards were observed throughout the research process. Participation was voluntary, informed consent was obtained from all respondents, and responses were kept strictly confidential. Data were used solely for academic purposes and analyzed in aggregate form, consistent with ethical guidelines for research involving human participants [23].

3. RESULTS

This section presents the study's empirical findings, organized according to Hypotheses H1-H5. The analyses examine the effect of success probability on binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions. Results are interpreted using binomial distribution logic, logistic regression, and mediation analysis, consistent with prior probabilistic decision-making studies [1], [2], [3].

3.1. Descriptive Statistics

A total of **N = 312** valid responses were included in the final analysis after data screening. Respondents represented Chief Finance Officers, Accounting Managers, Department Heads, Accountants, Bookkeepers, and Treasury officers across commercial, universal, and thrift banks. The average professional experience was 11.4 years, indicating a highly experienced respondent pool, consistent with recommendations for executive and professional decision research [4], [5].

3.2. Hypothesis 1

H1: Success probability generated by intelligent systems has a statistically significant effect on binary decision outcomes.

To test H1, binomial probability modeling and logistic regression were applied. Binary decision outcomes were modeled as a function of success probability levels presented in intelligent system scenarios.

Table 1: Logistic Regression Results for Success Probability and Binary Decision Outcomes (H1)

Predictor Variable	β Coefficient	Standard Error	Wald χ^2	p-value
Success Probability	1.872	0.214	76.58	<0.001
Constant	-0.964	0.301	10.25	0.001

The results indicate that success probability has a **positive and statistically significant effect** on binary decision outcomes ($p < 0.001$). Higher probability levels substantially increased the likelihood of affirmative decisions. These findings support H1 and are consistent with probabilistic decision theory and binomial outcome modeling in finance [6], [7], [8].

3.3. Hypothesis 2

H2: Higher levels of success probability are associated with greater consistency in binary decision outcomes.

Decision consistency was measured as the proportion of identical decisions across repeated scenarios with equivalent probability levels.

Table 2: Decision Consistency Across Success Probability Levels (H2)

Success Probability Level	Decision Consistency (%)
Low (≤0.40)	61.3

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Moderate (0.41–0.69)	74.8
High (≥0.70)	89.6

Results show a clear increase in decision consistency as success probability rises. High-probability scenarios produced the most uniform decisions, supporting H2. This pattern aligns with prior findings that stronger probabilistic signals reduce ambiguity and variance in professional judgment [9], [10], [11].

3.3 Hypothesis 3

H3: Decision threshold sensitivity mediates the relationship between success probability and binary decision outcomes.

Mediation analysis was conducted using a stepwise regression approach to examine the intervening role of decision threshold sensitivity.

Table 3: Mediation Analysis Results for Decision Threshold Sensitivity (H3)

Path	β Coefficient	p-value
Success Probability → Outcome	1.872	<0.001
Success Probability → Threshold	0.941	<0.001
Threshold → Outcome	0.682	<0.001
Direct Effect (Adjusted)	1.204	<0.01

The reduction in the direct effect after inclusion of decision threshold sensitivity indicates **partial mediation**, confirming H3. This result supports behavioral decision research suggesting nonlinear responses near cutoff points in probability-based decisions [12], [13], [14].

3.4. Hypothesis 4

H4: Alignment between finance and accounting decision-makers and intelligent system recommendations increases as success probability levels rise.

Alignment was measured as the proportion of decisions matching system recommendations across probability bands.

Table 4: Alignment with Intelligent System Recommendations (H4)

Success Probability Level	Alignment Rate (%)
Low (≤0.40)	**58.7**
Moderate (0.41–0.69)	**76.2**
High (≥0.70)	**92.4**

Results demonstrate a strong positive relationship between success probability and decision alignment, supporting H4. These findings are consistent with research on trust calibration and reliance on intelligent systems in professional settings [15], [16], [17].

3.5. Hypothesis 5

H5: Perceived success probability significantly predicts reliance on intelligent systems in binary decision-making.

Logistic regression analysis was used to assess whether perceived success probability predicts reliance on intelligent systems.

Table 5: Regression Results for Reliance on Intelligent Systems (H5)

Predictor Variable	β Coefficient	Standard Error	p-value
Perceived Success Probability	1.546	0.198	<0.001
Experience (Control)	-0.213	0.091	0.021

Perceived success probability significantly predicts reliance on intelligent systems ($p < 0.001$), supporting H5. The negative Coefficient for experience suggests that more experienced professionals exhibit slightly lower reliance, consistent with prior studies on expert judgment and algorithm aversion [18], [19], [20].

3.6. Summary of Hypothesis Testing

Table 6: Summary of Hypotheses Results

Hypothesis	Result
H1	Supported
H2	Supported
H3	Supported
H4	Supported
H5	Supported

Overall, the results demonstrate that success probability plays a central role in shaping binary decision outcomes in intelligent system–assisted financial and accounting contexts. The findings confirm that probability effects are not purely linear but are mediated by threshold sensitivity and professional judgment. These results extend prior probabilistic decision research by empirically validating binomial distribution logic in real-world finance and accounting decision environments, particularly in a developing-economy context [21], [22], [23].

4. DISCUSSION

The purpose of this study was to examine how success probability influences binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions. Guided by probabilistic decision theory and binomial distribution modeling, the findings provide empirical evidence that probability-based system outputs play a significant and structured role in shaping professional financial decisions. The discussion interprets these findings in relation to the research questions and highlights their theoretical and practical implications.

The results demonstrate that success probability has a statistically significant effect on binary decision outcomes, confirming that higher probability levels increase the likelihood of affirmative decisions. This finding reinforces the assumption that probability estimates serve as a primary decision signal in intelligent systems. However, the observed relationship is not purely mechanical. Rather than simply following probability values, decision-makers interpret success probability as an indicator of decision defensibility and risk acceptability, particularly in regulated financial environments. This interpretation aligns with the study's conceptual framework, which positions human judgment as an intervening mechanism between probabilistic inputs and outcomes.

The analysis also reveals that higher success probability levels are associated with greater consistency in decision outcomes. When probability signals are strong, finance and accounting professionals exhibit more uniform decision-making across similar scenarios. This pattern suggests that ambiguity decreases as probability increases, leading to clearer decision boundaries. Conversely, moderate probability levels lead to greater variability in outcomes, suggesting that uncertainty invites greater reliance on individual judgment, experience, and contextual considerations.

One of the most significant findings of the study is the presence of decision threshold sensitivity. The mediation analysis confirms that changes in success probability near perceived cutoff points result in disproportionate shifts in binary decisions. This nonlinear response highlights the importance of thresholds in professional financial decision-making.

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Rather than treating probability as a continuous influence, decision-makers appear to categorize probability levels into acceptable and unacceptable zones. This behavior underscores the relevance of binomial modeling in capturing real-world decision dynamics, as it reflects how binary outcomes emerge from probabilistic inputs.

The study further finds that alignment with intelligent system recommendations increases as success probability rises. When probability estimates are high, decision-makers are more likely to follow system-generated advice, suggesting that trust in intelligent systems is closely linked to the strength of probabilistic signals. At lower probability levels, decision-makers are more inclined to override system recommendations, reflecting cautious behavior in situations perceived as higher risk or less certain. This pattern illustrates a calibrated reliance on intelligent systems rather than blind automation.

Finally, the results indicate that perceived success probability significantly predicts reliance on intelligent systems, even after accounting for professional experience. While more experienced professionals exhibit slightly lower reliance, success probability remains a strong predictor of system use. This finding suggests that probability-based outputs retain influence across experience levels, though seasoned professionals may exercise greater discretion. This balance between system reliance and professional judgment reflects the hybrid nature of intelligent system–assisted decision-making in finance and accounting contexts.

Collectively, the findings contribute to the literature by demonstrating that binomial probability models meaningfully explain binary decision outcomes in intelligent systems when human interpretation is explicitly considered. The study extends existing research by situating probabilistic decision-making within a developing-economy context and by focusing on finance and accounting professionals rather than solely on technical system performance. From a practical perspective, the results highlight the importance of clearly communicated probability thresholds, transparent system design, and training in probabilistic reasoning for finance professionals.

In summary, the discussion confirms that success probability is a powerful but mediated driver of binary decision outcomes in intelligent systems. The interaction between probabilistic modeling and professional judgment shapes how decisions are ultimately made, reinforcing the need for intelligent systems that support, rather than replace, human decision-makers in financial institutions.

5. CONCLUSION

This study examined how success probability influences binary decision outcomes in intelligent systems used by finance and accounting decision-makers in Philippine banks and financial institutions. The findings confirm that probability-based system outputs significantly shape decision behavior, but their effects are mediated by professional judgment and threshold sensitivity.

5.1. Theoretical Contribution

This study contributes to the literature by extending the application of the binomial distribution beyond theoretical modeling into real-world, intelligent–system–assisted decision-making. It demonstrates that binary financial decisions are not purely driven by probability values but are shaped by threshold-based interpretation and behavioral factors. By integrating probabilistic modeling with decision science, the study offers a more comprehensive explanation of how discrete decision outcomes emerge in professional financial contexts.

5.2. Practical Contribution

From a practical perspective, the findings highlight the importance of designing intelligent systems that present probability information clearly and interpretably. Financial institutions can improve decision quality by establishing well-defined probability thresholds, enhancing transparency in system outputs, and strengthening the probabilistic reasoning capabilities of finance professionals. These improvements can lead to more consistent, reliable, and defensible decision-making processes.

5.3. Policy Contribution

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At the policy level, the results underscore the need for governance frameworks that address the use of intelligent systems in financial decision-making. Regulators and institutions may consider guidelines that ensure transparency, accountability, and proper oversight of probability-based decision tools. As financial systems become increasingly data-driven, policies that balance automation with human judgment will be essential for maintaining trust and stability.

In summary, success probability is a critical but mediated driver of binary decision outcomes. The study provides empirical evidence for integrating probabilistic models and human judgment into intelligent systems, offering valuable insights for both academic research and financial practice.

6. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Despite its contributions, this study has several limitations that should be acknowledged when interpreting the findings. Recognizing these limitations provides important context for the results and offers guidance for future research.

First, the study used a survey-based research design to capture respondents' decisions through structured scenarios and self-reported measures. While this approach allowed for a controlled examination of probability-driven decision-making across a large, professionally relevant sample, it may not fully capture the complexity and time pressure of real-world financial decision environments. Actual decisions in banks and financial institutions often involve dynamic information, organizational constraints, and interpersonal considerations that are difficult to replicate in survey instruments.

Second, the study focused on finance and accounting decision-makers within Philippine banks and financial institutions. Although this context provides valuable insights from a developing economy perspective, the findings may not be directly generalizable to other countries or financial systems with different regulatory frameworks, cultural norms, or levels of technological maturity. Decision behavior may vary across jurisdictions where institutional expectations and risk tolerances differ.

Third, the operationalization of success probability was based on probability values presented by intelligent systems within predefined decision scenarios. While this approach aligns with the study's binomial framework, it does not account for potential differences in how probabilities are generated across various intelligent system architectures. Variations in model transparency, explainability, and data quality may influence how decision-makers perceive and trust probability outputs.

Fourth, the study examined decision threshold sensitivity as a mediating mechanism but did not explicitly model other psychological or organizational factors that may influence decision behavior. Factors such as risk appetite, organizational culture, incentive structures, and regulatory scrutiny could further shape how probability information is interpreted and acted upon.

Future research can address these limitations in several ways. Longitudinal studies using real decision data from financial institutions would provide deeper insights into how probability-driven decision behavior evolves over time and under changing economic conditions. Experimental designs that manipulate the presentation of probability, such as visualizations or confidence intervals, could further illuminate how intelligent system interfaces affect decision outcomes.

Comparative studies across countries or regions would help determine whether the observed threshold effects and reliance patterns hold in different institutional contexts. Future research may also extend the binomial framework by incorporating more complex probabilistic models, such as Bayesian updating or multinomial outcomes, to capture a broader range of financial decision scenarios.

Finally, qualitative research, such as interviews or case studies, with finance and accounting professionals could complement quantitative findings by providing richer insights into how professionals reason about probability, trust intelligent systems, and balance algorithmic recommendations with professional judgment. Such mixed-method approaches would further strengthen the understanding of intelligent system–assisted decision-making in finance and accounting.

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