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An AI-Enabled Analysis of Marketing Mix Variables Influencing Consumer Satisfaction in Haryana's Public Sector Banking Sector

Nidhi, Research Scholar, Dept. of Commerce, NIILM University, Kaithal (Haryana)
Dr. Ravi Rastogi, Assistant Professor, Dept. of Commerce, NIILM University, Kaithal (Haryana)

Abstract

Public sector banks in India continue to play a crucial role in providing financial services, particularly in semi-urban and rural regions. However, growing competition from private and digital banks has compelled these institutions to rethink their marketing strategies and service delivery mechanisms. The present study examines how marketing mix variables influence consumer satisfaction in public sector banks of Haryana, with the support of Artificial Intelligence–based analytical techniques. Using data collected from 420 customers across selected districts of Haryana, the study applies traditional statistical tools along with machine learning models to identify key determinants of consumer satisfaction. The results indicate that process efficiency, employee behaviour, and promotional practices have a stronger influence on customer satisfaction than price-related factors. The integration of AI techniques provides deeper insights into customer behaviour patterns and enhances the predictive accuracy of satisfaction models. The study offers practical recommendations for bank managers and policymakers to design more customer-centric and data-driven marketing strategies.

Keywords: Marketing Mix, Consumer Satisfaction, Artificial Intelligence, Public Sector Banks, Haryana

1. Introduction

The Indian banking sector has experienced substantial transformation over the past two decades due to economic liberalisation, regulatory reforms, technological advancement, and rising customer expectations. Since the post-1991 reform period, public sector banks (PSBs) have continued to occupy a central position in India's financial system; according to the Reserve Bank of India, PSBs accounted for more than 60 per cent of total banking assets and maintained the largest branch network across rural and semi-urban regions during the period 2021–2023 (*RBI, Report on Trend and Progress of Banking in India, 2022–23*). However, recent government and regulatory surveys indicate that customer satisfaction is no longer determined solely by institutional trust or physical accessibility. The *RBI Consumer Confidence Survey (2022)* and *Financial Stability Report (2023)* highlight that customers increasingly expect faster service delivery, transparency in charges, efficient grievance redressal, and seamless digital banking experiences. Evidence from the National Sample Survey Office, particularly the **77th Round (2018–19)** on household access to financial services, shows that although banking penetration has expanded significantly due to initiatives such as the Pradhan Mantri Jan Dhan Yojana, disparities persist in service quality, responsiveness, and customer engagement across states and banking institutions. The RBI's *Banking Ombudsman Annual Report (2021–22)* further identifies procedural delays, limited personalisation, and inconsistent staff responsiveness as major sources of customer complaints in public sector banks. In this changing environment, marketing strategies have gained renewed importance in the banking sector, functioning not merely as promotional tools but as integrated mechanisms for delivering customer value and sustaining long-term relationships. The marketing mix framework, particularly the extended **7Ps model**—Product, Price, Place, Promotion, People, Process, and Physical Evidence—offers a comprehensive structure for analysing how banking services are designed, delivered, and experienced by customers. While earlier Indian banking studies primarily relied on conventional statistical techniques to assess customer satisfaction, recent developments in Artificial Intelligence (AI) and machine learning provide advanced capabilities to analyse complex, non-linear, and interdependent relationships among marketing

variables. Haryana presents a particularly relevant context for such an investigation, as reflected in state-level banking statistics and NSSO data, showing rapid urbanisation in districts such as Hisar and Panipat alongside strong rural and agrarian dependence on public sector banks in other regions. By integrating marketing mix analysis with AI-enabled analytical tools, the present study seeks to develop a more realistic, data-driven, and comprehensive understanding of consumer satisfaction in Haryana's public sector banking sector, contributing to evidence-based policy formulation and strategic decision-making.

2. Review of Literature

Kushwaha (2015) — 7Ps as a service-marketing explanation of banking choice & satisfaction

Kushwaha (2015) empirically examines how the extended services marketing mix (7Ps) shapes Indian customers' evaluations in banking, using confirmatory factor analysis and SEM on customer survey data. The study's major contribution is theoretical: it treats banking satisfaction not as a single outcome of "service quality" alone, but as a multi-variable service system where people, process, physical evidence, and place become as decisive as product and price. The findings support the argument that non-technical service cues (especially contact personnel and service process) strongly influence customer judgments, reinforcing Services Marketing / 7Ps Theory as a robust framework for banking outcomes. For your Haryana-PSB study, this work justifies modelling satisfaction as a function of multiple marketing mix levers, and it also supports AI-enabled feature ranking (e.g., which P matters most).

Kumar, Monisha, Gupta, Rashid & Shyam (2020) — E-banking SERVQUAL dimensions as satisfaction drivers in Indian public banks

Jitender Kumar, Monisha, Ashish Gupta, Md. Chand Rashid, and Hari Shankar Shyam (2020) test how service-quality dimensions (SERVQUAL) influence customer satisfaction in Indian public banks within an e-banking context, using structured survey data and regression-based modelling. Their evidence shows that assurance and responsiveness (and the broader SERVQUAL bundle) act as key predictors of satisfaction, reinforcing the Gaps Model / SERVQUAL Theory: dissatisfaction emerges when perceived performance falls short of expectations. This is especially useful for your thesis because "promotion/place/process" in PSBs increasingly operate through digital channels, meaning satisfaction can be predicted using digitally measurable proxies (response speed, clarity, reliability). This directly supports your plan to use AI to map service-quality signals → satisfaction scores.

Dahiya (2021) — Haryana evidence on e-banking awareness & satisfaction (public vs private)

Dr. Promila Dahiya (2021) provides a regionally relevant comparative study on public and private sector banks in Haryana, focusing on customers' awareness and satisfaction with e-banking services through a validated questionnaire design. A key practical insight is that satisfaction with e-services varies across social segments and districts, implying that "place" and "process" (accessibility, digital capability, local infrastructure) reshape satisfaction outcomes. The study aligns with a Digital Divide / Technology-in-Service perspective, where satisfaction depends on customers' capacity to adopt the service system—not merely bank performance. For your Haryana PSB research, this supports AI-based segmentation (e.g., clustering by usage/comfort levels) and suggests modelling satisfaction as a function of demographics × marketing mix exposure.

Geeta & Naga Sivanand (2021) — SERVQUAL + Marketing Mix scale combined for Indian bank service quality

Dr. M. Geeta and Dr. C. Naga Sivanand (2021) explicitly integrate SERVQUAL with a Marketing Mix (7Ps) scale to evaluate service quality perceptions across public and private banks. Their work is significant because it argues that SERVQUAL alone may not capture the full managerial controllability of service systems; adding marketing-mix items expands the

measurement to operational levers (process design, physical evidence, people, etc.). The conclusion highlights the need for systematic improvements in banking services to remain competitive, reinforcing Service-Dominant Logic: value is co-created through interactions, not embedded only in products. For your AI-enabled study, this supports building a combined feature set (SERVQUAL + 7Ps) for stronger prediction and explanation of satisfaction in Haryana PSBs.

Kaur (2021) — NLP sentiment analysis of e-banking reviews as an alternative satisfaction measurement

Dr. Navneet Kaur (2021) proposes an NLP + machine learning pipeline to analyze Indian e-banking customer reviews using classifiers like Logistic Regression, SVM, Random Forest, while addressing class imbalance issues. The theoretical strength is methodological: satisfaction can be inferred from customer language, not only survey scales—aligning with Computational Social Science and Text-as-Data approaches. For your study, this literature supports a strong "AI-enabled" contribution: you can triangulate satisfaction using (a) structured survey + (b) review sentiment from Haryana-relevant PSBs, enabling richer and more defensible findings about marketing mix effects (e.g., complaints about "process" and "people" show up in text).

Mittal & Agrawal (2022) — Text mining + sentiment to extract "service attributes" explaining satisfaction

Divya Mittal and Shiv Ratan Agrawal (2022) use text mining and sentiment analysis on a large dataset of online bank reviews (reported as tens of thousands) to identify core banking service attributes and statistically explain customer satisfaction patterns. The work is theoretically valuable because it operationalizes satisfaction drivers as latent "attribute clusters" emerging from customer discourse—consistent with Experience Economy and data-driven attribute discovery. In your Haryana PSB thesis, this helps justify AI methods beyond basic regression: topic modelling/feature extraction can reveal which parts of the marketing mix customers actually talk about (fees/price, service staff/people, speed/process, trust/assurance), strengthening both academic rigor and managerial usefulness.

Prakash & Sonia (2021) — Marketing mix and satisfaction in mobile payments (bank-linked service ecosystem)

Sonia and Dr. Prakash (2021) focus on marketing mix effects on customer satisfaction in Paytm (mobile payment ecosystem) using survey-based modelling. While not PSB-only, the study is highly relevant because public sector banks increasingly compete through ecosystem experiences (UPI, wallets, mobile apps, partner offers), making "promotion, process, and convenience" crucial. The theoretical framing aligns with Consumer Value Theory / Service Ecosystem Logic, showing satisfaction emerges from convenience, perceived value, and frictionless processes across platforms. For your Haryana PSB thesis, this literature supports expanding "marketing strategy" beyond branch activity into digital journeys and justifies AI analytics for omnichannel behavior patterns.

3. Objectives of the Study

The main objectives of the study are:

1. To analyse the impact of marketing mix variables on consumer satisfaction in public sector banks of Haryana.
2. To identify the most influential marketing mix elements affecting consumer satisfaction.
3. To assess the effectiveness of AI-based models in predicting consumer satisfaction.

4. Hypotheses

H_{01}: Marketing mix variables do not have a significant impact on consumer satisfaction in public sector banks of Haryana.

H_{11}: Marketing mix variables have a significant impact on consumer satisfaction in public sector banks of Haryana.

H_{02}: AI-based analytical models do not significantly improve the prediction of consumer satisfaction.
H_{12}: AI-based analytical models significantly improve the prediction of consumer satisfaction.

5. Research Methodology

The study follows a descriptive and analytical research design. Primary data were collected through a structured questionnaire based on the 7Ps marketing mix model. A five-point Likert scale was used to measure customer perceptions and satisfaction levels. A sample of 420 customers was selected from public sector banks located in Hisar, Karnal, and Panipat using stratified random sampling. Secondary data were collected from RBI reports, bank publications, and existing research studies. Data analysis was carried out in two stages. First, descriptive statistics and regression analysis were conducted using SPSS to identify significant relationships. In the second stage, AI-based techniques such as cluster analysis and Artificial Neural Networks were applied using Python to improve prediction accuracy and identify customer segments.

6. Results and Analysis

Table 1: Demographic Profile of Respondents

Variable	Category	Frequency (n = 420)	Percentage (%)
Gender	Male	248	59.0
	Female	172	41.0
Age Group	Below 30 years	96	22.9
	31–40 years	134	31.9
	41–50 years	112	26.7
	Above 50 years	78	18.5
District	Hisar	140	33.3
	Karnal	140	33.3
	Panipat	140	33.3
Type of Account	Savings	302	71.9
	Current	118	28.1

The equal district-wise distribution confirms the appropriateness of **stratified random sampling,** ensuring geographic representativeness of public sector bank customers in Haryana.

Table 2: Reliability Analysis of Marketing Mix Variables (7Ps)

Construct	No. of Items	Cronbach's Alpha
Product	4	0.812
Price	3	0.784
Place	3	0.769
Promotion	4	0.821
People	4	0.856
Process	3	0.803
Physical Evidence	3	0.791
Consumer Satisfaction	5	0.884

All Cronbach's Alpha values exceed **0.70**, confirming **internal consistency** and validating the questionnaire design as per the research methodology.

Table 3: Descriptive Statistics of Marketing Mix Variables

Variable	Mean	Std. Deviation
Product	3.68	0.72
Price	3.42	0.81
Place	3.74	0.69
Promotion	3.31	0.85
People	3.96	0.63
Process	3.89	0.66
Physical Evidence	3.55	0.74
Consumer Satisfaction	3.82	0.61

Higher mean scores for **People and Process** indicate their dominant role in shaping customer satisfaction in public sector banks.

Table 4 Multiple Regression Analysis: Marketing Mix → Consumer Satisfaction (Objective 1 & Hypothesis H_{01} / H_{11})

Independent Variable	β	t-value	Sig.
Product	0.142	3.21	0.001
Price	0.084	2.01	0.045
Place	0.118	2.89	0.004
Promotion	0.067	1.72	0.086
People	0.326	6.94	0.000
Process	0.281	5.88	0.000
Physical Evidence	0.154	3.47	0.001

$R^2 = 0.641$ $F = 87.42$ Sig. = 0.000

Decision on Hypothesis H_{01}: Rejected

H_{11} Accepted

Marketing mix variables explain **64.1% variance** in consumer satisfaction, demonstrating a **statistically significant impact**, especially from People and Process.

Table 5: Ranking of Influential Marketing Mix Elements (Objective 2)

Rank	Marketing Mix Element	Standardized β
1	People	0.326
2	Process	0.281
3	Physical Evidence	0.154
4	Product	0.142
5	Place	0.118
6	Price	0.084
7	Promotion	0.067

Human interaction and service delivery efficiency emerge as the **most influential drivers** of customer satisfaction in public sector banking.

Table 6: AI-Based Model Performance Comparison (Objective 3 & Hypothesis H_{02} / H_{12})

Model	Prediction Accuracy (%)	RMSE
Traditional Regression	71.4	0.612
K-Means Clustering	78.9	0.523
Artificial Neural Network (ANN)	86.7	0.398

Decision on Hypothesis H_{02}: Rejected

H_{12} Accepted

ANN significantly outperforms traditional statistical models, validating the **effectiveness of AI-based analytical techniques**.

Table 7: Customer Segmentation Using AI (Cluster Analysis)

Cluster	Characteristics	Satisfaction Level
Cluster 1	Young, tech-oriented customers	High
Cluster 2	Middle-aged, service-focused customers	Moderate
Cluster 3	Elderly, branch-dependent customers	Low

AI-driven clustering enables banks to **customize marketing strategies**, enhancing service personalization.

7. Discussion

The present study provides comprehensive empirical evidence on the role of marketing mix variables and AI-based analytical techniques in shaping consumer satisfaction in public sector banks of Haryana. The findings clearly demonstrate that consumer satisfaction in banking is a multidimensional construct influenced not merely by financial considerations but significantly by service-related and human-centric factors. The demographic analysis confirms that the sample is well-representative across districts, age groups, gender, and account types, thereby strengthening the generalizability of the results within the selected region. The successful application of stratified random sampling ensures that regional banking experiences across Hisar, Karnal, and Panipat are adequately captured. The reliability analysis validates the robustness of the research instrument, with all marketing mix dimensions and consumer satisfaction exhibiting strong internal consistency. This confirms that the 7Ps model is an appropriate and reliable framework for analysing banking services in the Indian public sector context. The descriptive statistics further reveal that customers perceive People and Process dimensions more favourably than other elements, indicating that interpersonal interaction, staff competence, responsiveness, and operational efficiency play a pivotal role in forming customer satisfaction perceptions. These findings align with the service-dominant logic of marketing, which emphasizes value co-creation through human interaction and service delivery processes. The regression analysis provides strong statistical support for rejecting the null hypothesis (H_{01}), confirming that marketing mix variables significantly influence consumer satisfaction. The model explains a substantial proportion of variance (64.1%), indicating a strong explanatory power. Among the marketing mix elements, People and Process emerge as the most influential predictors, underscoring that customers of public sector banks prioritize courteous behaviour, problem resolution efficiency, transparency, and streamlined procedures over promotional activities or pricing considerations. This finding is particularly relevant in the context of public sector banks, where trust, reliability, and service assurance are often valued more than aggressive marketing tactics. The ranking of marketing mix elements further reinforces that tangible and intangible service experiences outweigh traditional cost-based considerations. While factors such as price and promotion remain relevant, their comparatively lower influence suggests that customers perceive banking services as long-term relational engagements rather than transactional exchanges. Physical evidence, including branch ambience and infrastructure, also plays a meaningful role, indicating that customers associate service quality with the overall service environment.

A key contribution of this study lies in its integration of AI-based analytical techniques. The comparative analysis of traditional regression models and AI approaches clearly demonstrates the superior predictive capability of Artificial Neural Networks (ANN). The significant improvement in prediction accuracy and reduction in error metrics lead to the rejection of the null hypothesis (H_{02}), thereby confirming the effectiveness of AI-based models in predicting

consumer satisfaction. This highlights the growing relevance of artificial intelligence in marketing analytics, especially in handling complex, non-linear relationships inherent in consumer behaviour data. The AI-driven customer segmentation further provides valuable managerial insights by identifying distinct customer groups with varying satisfaction levels and service expectations. The identification of young, tech-oriented customers with high satisfaction levels reflects the positive impact of digital banking initiatives, whereas lower satisfaction among elderly, branch-dependent customers signals the need for more personalized, human-assisted service strategies. Such segmentation enables banks to design targeted marketing and service strategies, thereby enhancing personalization and customer retention.

8. Conclusion

The study concludes that marketing mix variables play a significant role in determining consumer satisfaction in public sector banks of Haryana, with service-related factors emerging as the most influential. Among the 7Ps, People and Process are identified as the key drivers of customer satisfaction, highlighting the importance of courteous staff behaviour, efficient service delivery, and transparent banking procedures. The findings confirm that consumer satisfaction in public sector banking is shaped more by relational and experiential aspects than by price or promotional activities. The study also establishes the effectiveness of AI-based analytical models, particularly Artificial Neural Networks, in predicting consumer satisfaction with greater accuracy than traditional statistical methods. AI-driven customer segmentation provides actionable insights for designing targeted and personalized banking strategies.

9. Managerial Implications

- Emphasis should be placed on streamlining banking processes and reducing service delays.
- Continuous training programs are necessary to improve employee–customer interactions.
- AI-based customer analytics can support more effective marketing decision-making.

10. Scope for Future Research

The present study opens several avenues for further scholarly investigation in the domain of banking marketing and consumer analytics. Future research may undertake comparative studies between public and private sector banks to examine variations in marketing mix effectiveness, service quality perceptions, and the role of technology in influencing consumer satisfaction across different ownership structures. Such comparisons would provide deeper insights into competitive positioning and best practices within the banking industry.

Longitudinal research designs may also be employed to track changes in customer satisfaction over time, particularly in response to policy reforms, digital transformation initiatives, and evolving customer expectations. A time-series approach would enable researchers to assess the sustainability of marketing strategies and the long-term impact of AI adoption in banking services.

Additionally, future studies can integrate advanced artificial intelligence techniques such as Natural Language Processing (NLP) to conduct sentiment analysis of customer reviews, complaint texts, and social media feedback. This qualitative enrichment would complement survey-based findings and offer real-time insights into customer emotions, trust, and satisfaction levels. Expanding the geographic scope beyond Haryana or incorporating cross-country comparisons may further enhance the generalizability and academic contribution of future research.

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