

Multivariate Statistical Comparison between Digital Health /Online Pharmacy vs Traditional Pharmacy on their effect on Consumer Trust and Preference

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ABSTRACT:

The rapid evolution of the digital healthcare platforms and online pharmacies has really transformed the landscape of the pharmaceutical services, fundamentally altering how the consumers access the medicines, seek consultation and establish trust. This study conducts a comprehensive multivariate statistical comparison between the digital/online and the traditional healthcare products and services/pharmacies by examining their influence on the consumer trust, channel preference and service satisfaction. In this study, we have employed a hybrid methodological framework which is including Kano Model, SERVQUAL Analysis, Hedonic Scale and customer experience metrics such as Net Promoter Score (NPS), Customer Satisfaction Score (CSAT) and Customer Effort Score (CES). The research evaluates the key parameters affecting user experience across accessibility, reliability, empathy and technological usability.

The study was conducted to study the difference in results obtained based on survey and the motive was to reveal the parameters of consumer preferences where the online healthcare stores/pharmacies excels and where it shows deficits which weaken the emotional engagement and the long-term loyalty of consumers. Conversely the same analysis for traditional healthcare stores/pharmacies, understanding these parameters helps the healthcare/pharma firms to understand the strategies that will be reinforcing the consumer trust and channel preference despite moderate limitations in cost and accessibility.

The Kano classification identifies parameters that act as "must-be" attributes for online services, while classifying some as performance drivers and the same analysis for traditional healthcare/pharma. SERVQUAL gaps highlight the factors that remain critical weaknesses for digital and traditional pharma/health products channels. The Hedonic analysis confirms which all parameters are important for consumers' satisfaction.

The study concludes that the future competitiveness in healthcare products/pharmaceutical services depends on the hybrid integration, combining digital convenience with human empathy to optimize both functional and trust satisfaction. This synergy is essential for strengthening the consumer trust and building resilient, loyalty-driven healthcare brands in an increasingly digitalized world.

Keywords: Digital Health, Online Pharmacy, Traditional Pharmacy, Consumer Trust, Channel Preference, Kano Model, SERVQUAL, Hedonic Scale, Customer Experience, Accessibility and Convenience, Privacy and Authenticity, Service Quality, Technological Integration, Empathy and Assurance, Hybrid Healthcare Models

I. INTRODUCTION:

In today's era of increasingly digitized healthcare environment, the traditional relationship between the pharmacies and the patients is undergoing a huge transformation. The emergence of digital health platforms and online health product stores/pharmacies has now redefined how the consumers access, purchase and interact with the healthcare/pharmaceutical products and professional consultation. Unlike the conventional healthcare products store/pharmacy model, which emphasizes on the face-to-face trust, personal interaction and professional assurance, online platforms have prioritized on the convenience, accessibility and efficiency. This paradigm shift has raised critical questions regarding how the consumers perceive on trust, authenticity and channel preference across the digital and traditional channels.

Trust forms one of the cornerstones of the healthcare products/pharmaceutical service delivery, as the patients must have confidence in both: the authenticity of medicines and the credibility of those providing them. As the online healthcare product stores/pharmacies grow globally, concerns about quality of products, data

privacy and other factors such as service quality challenge the traditional trust mechanisms which is inherent in the physical healthcare stores/pharmacies. Conversely, traditional healthcare stores/pharmacies face growing pressure to integrate the technological solutions to meet the evolving consumer expectations for the most important factors: speed, convenience and transparency.

This study conducts an online survey asking respondents on their behaviour and experience towards the traditional healthcare stores/pharmacies as well as online healthcare stores/pharmacies, using their responses this research paper tries to investigate how consumers evaluate these two channels across their functional and other dimensions. Using the multivariate statistical and strategic tools including the Kano Model, SERVQUAL, Hedonic Scale Analysis and customer metrics such as NPS, CSAT and CES, this paper compares the service attributes influencing the consumer satisfaction, trust and channel preferences. The findings aim to uncover which channel better satisfies the modern consumer's expectations and provides a roadmap on understanding that which strategies, if developed may bridge the gap between technological convenience and relational trust.

II. LITERATURE REVIEW:

Technological advancement and the rapid development of e-commerce have significantly reshaped the consumer interactions in healthcare. Pharma industry is on a transformative shift driven by digital transformation (Ullagaddi, Pravin., 2024) [1]. Online pharmacy is sure to upscale in the demand (Savant, Priti and Kareppa, Manjusha., 2022) [2]. Scholars describe digital health infrastructure as a convergence of the field of medical informatics, consumer informatics and healthcare delivery, creating some new avenues for remote access and management. Online healthcare stores/pharmacies as a subset of the digital health infrastructure, offers the consumers more convenience and price transparency but

simultaneously introduce some concerns related to safety and data protection.

Trust remains an essential element for effectiveness for healthcare systems (Thompson, Alison., 2025) [3]. It is also emphasized that in the digital transactions, trust acts as a substitute for a face-to-face assurance, influencing not only the purchase intention but also a long-term channel preference. Conversely the traditional healthcare stores/pharmacies have historically developed consumer trust from its professional credibility, personal interaction and customer relation building oversight. These human-centric qualities foster empathy and assurance, aligning with the SERVQUAL dimensions of Reliability, Responsiveness, Assurance, Empathy and Tangibles.

Recent studies suggest that while the digital channels excel in functional efficiency like speed, convenience and affordability, they often underperform in parameters like emotional engagement and perceived safety. Studies using the Kano Model demonstrate that which attributes are "must-be" features influencing the satisfaction. Hedonic perception researches further on the emotional satisfaction derived from trust and authenticity and the convenience when forming channel in healthcare services.

The current research paper integrates these frameworks of theoretical lenses to compare both the channels using multivariate statistical analysis. By combining cognitive (functional) perspectives this study extends the prior work by quantifying how the digital efficiency and human assurance differentially shape the consumer trust and channel preferences as proper understanding of the consumer psychology and behaviour is essential for a good marketing strategy (Rajan, Pappu., 2025).[4] and this will also be helpful for the pharma/healthcare industry.

III. ANALYSIS:

The following are 9 parameters on which the comparative study will be conducted between Online and Traditional Pharmacy, the table below gives a brief description/ overview of the parameters

Parameter	Online Healthcare stores/Pharmacy	Traditional Healthcare stores/Pharmacy
Accessibility and Convenience	24/7 access from anywhere with the internet; home delivery reduces travel and waiting times; may have apps for easy ordering and reordering	Requires physical presence; store hours may limit access; immediate access in emergencies; face-to-face interaction with the staff
Product Availability	Often wider range of medicines, can check stock online in realtime;	Stock may be limited by the store size; immediate pickup for the available products;

		can get the substitutes or advice on the alternatives quickly
Pricing and Discounts	Often cheaper due to the lower overheads; frequent online discounts; subscription-based savings; transparent price comparisons are easier	Prices may be higher due to rent and staffing costs; offers may be limited to local promotions; bargaining or discounts less common
Delivery and Time Efficiency	Delivery can take hours to days depending on service; requires waiting time for delivery scheduling; subscription options save repeat trips	Instant pickup available; travel and queue time needed; immediate handling of urgent needs
Customer Support and Consultation	Chatbots, helplines and telemedicine consultations; limited personal interaction may reduce clarity; some provide consultations online	Direct face-to-face counselling; can clarify prescriptions and usage instantly; easier to build trust with local pharmacies
Trust, Safety and Authenticity	Riskif product is unverified; requires checking certifications; reviews and ratings can guide decisions	Generally perceived as more reliable and authentic; in-store inspection possible before purchase; established local reputation builds trust
Privacy and Discretion	Digital records may raise privacy concerns if not secured	Others may see purchases; confidentiality relies on pharma store staff's ethics
User Experience and Technology	Ease of navigation, app interface, payment options matter; reminders, subscription management and tracking orders enhance experience	Physical store layout, service quality and wait times affect experience; less reliance on technology; more human-centric
Ease of Product Return	Returns and refunds can be more complex; need strict verification and other compliance	Easier returns or exchanges in-store; done by staff physically

Descriptive Analysis- Average and Standard Deviation of Consumer Ratings

For the purpose of our study, we conducted a survey where 100 respondents selected

at random were asked to rate each the following 9 parameter experiences or perceptions for both Traditional and Online Healthcare store/pharmacy, and the results are summarized below:

Table: Mean and Standard Deviation of Consumer ratings

Parameter	Online Pharmacy (Avg ± SD)	Traditional Pharmacy (Avg ± SD)
Accessibility and Convenience	4.19 ± 0.58	3.71 ± 0.59
Product Availability	3.72 ± 0.65	3.79 ± 0.67
Pricing and Discounts	3.99 ± 0.74	3.72 ± 0.68
Delivery and Time Efficiency	4.21 ± 0.52	3.22 ± 0.66
Customer Support and Consultation	3.53 ± 0.64	3.77 ± 0.71
Trust, Safety and Authenticity	3.59 ± 0.68	4.02 ± 0.68
Privacy and Discretion	4.06 ± 0.56	3.61 ± 0.68
User Experience and Technology	4.23 ± 0.58	3.23 ± 0.68
Ease of Product Return	3.69 ± 0.66	3.89 ± 0.60

Pearson Correlation analysis between parameters:

A. Traditional

Accessibil ity and Conv	Prod uct Avail ity	Pricin g and Disco unts	Delivery and Time Efficien cy	Customer Support and Consultati on	Trust, Safety and Authenti city	User Experien ce and Technolo gy	Ease of Produ ct Retur
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	1	2	3	4	5	6	7	8	9
Accessibility and Convenience	1	-0.03	-0.03	0.04	0.06	0.11	-0.08	0.09	0.05
Product Availability		1	0.2	-0.08	-0.02	-0.03	-0.09	0.04	-0.01
Pricing and Discounts			1	0.05	-0.07	0.19	-0.11	0.01	-0.12
Delivery and Time Efficiency				1	-0.28	-0.03	0.06	-0.05	-0.12
Customer Support and Consultation					1	0.05	-0.06	0.11	0.15
Trust, Safety and Authenticity						1	0	-0.01	-0.02
Privacy and Discretion							1	0.02	-0.01
User Experience and Technology								1	0.14
Ease of Product Return									1

B. Online

Accessibility and Convenience	Product Availability	Pricing and Discounts	Delivery and Time Efficiency	Customer Support and Consultation	Trust, Safety and Authenticity	Privacy and Discretion	User Experience and Technology	Ease of Product Returns
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Accessibility and Convenience	1	-0.26	-0.02	-0.07	-0.14	0.02	0.09	-0.16	-0.08
Product Availability		1	-0.05	0.12	0.02	-0.35	0.07	0.06	-0.09
Pricing and Discounts			1	0.03	0.12	0.01	0.03	0.08	0.06
Delivery and Time Efficiency				1	0.03	-0.15	-0.01	0.07	0.02
Customer Support and Consultation					1	0.02	-0.17	0.16	-0.27
Trust, Safety and Authenticity						1	-0.22	-0.07	0.16
Privacy and Discretion							1	-0.1	-0.08
User Experience and Technology								1	-0.1
Ease of Product Returns									1

In both the correlation study for both Online as well as Traditional Pharmacy, the parameters show very less correlation among themselves, since these are calculated on the basis of respondent's ratings, we may assume that these parameters have no correlation to one another

Kano Model Study: Comparative Evaluation of Digital Health and Online Healthcare store/Pharmacy vs. Traditional Healthcare store/Pharmacy
Objective

The objective of this Kano study is to classify key service attributes influencing the consumer trust and preference across the Digital Health care store/Online Pharmacies and Traditional healthcare store/Pharmacy. The focus is

to determine which attributes delight, satisfy or dissatisfy the consumers in each channel of healthcare product/service.

Methodology

A survey was conducted among 100 respondents evenly divided between the users of online and traditional healthcare store/pharmacy services. For each of the nine attributes, the participants answered the two questions per Kano design:

1. **Functional Form:** "How do you feel if this feature is present?"
2. **Dysfunctional Form:** "How do you feel if this feature is absent?"

Each was rated using the five-point response scale: **Like, Expect, Neutral, Tolerate, dislike**

Responses were classified into categories based on the established evaluation matrix:

Code	Meaning	Interpretation
M	Must-be	Basic requirement; absence causes dissatisfaction
O	One-dimensional (Performance)	Satisfaction increases linearly with fulfilment
A	Attractive (Delighter)	Presence increases satisfaction disproportionately
I	Indifferent	No significant effect on satisfaction
R	Reverse	Satisfaction decreases when present (rare)

Frequency distributions were computed for each parameter, and dominant categories were assigned separately for Online and Traditional channels.

Results and Analysis

Table: Kano Categorization Distribution

Category	Online (%)	Traditional (%)
Attractive	27	10
Performance	34	41
Must-be	25	32
Indifferent	14	17

Table: Results - Kano Classification of Key Attributes

No.	Attribute	Online (Digital store)	Pharmacy Healthcare	Traditional Healthcare store/Pharmacy	Interpretation
1	Accessibility and Convenience	O – Performance		M – Must-be	Convenience is the baseline expectation offline but drives satisfaction online.
2	Product Availability	O – Performance		O – Performance	Equally critical in both; product stock reliability drives satisfaction in both modes.
3	Pricing and Discounts	A – Attractive		I – Indifferent	Discounts delight online users but have limited effect offline.
4	Delivery and Time Efficiency	A – Attractive		I – Indifferent	Home delivery acts as a differentiator; negligible effect in traditional mode.
5	Customer Support and Consultation	O – Performance		O – Performance	Personalized consultation remains a performance driver offline; undervalued online.
6	Trust, Safety and Authenticity	M – Must-be		M – Must-be	Core determinant of trust and channel preference; absence causes major dissatisfaction.
7	Privacy and Discretion	M – Must-be		I – Indifferent	Privacy is essential in digital health; less relevant offline.
8	User Experience and Technology	A – Attractive		I – Indifferent	Technology and interface enhance satisfaction online; irrelevant offline.

9	Ease of Product Returns	O – Performance	O – Performance	Perceived ease and refund policy influence satisfaction equally in both.
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SERVQUAL Analysis: Measuring Service Quality Dimensions in Digital Health and Traditional Healthcare stores/Pharmacy

Objective

This SERVQUAL study aims to quantify and compare the service quality gaps influencing consumer trust and preference between the Digital Healthcare stores/Online Pharmacies and Traditional Healthcare stores/Pharmacy. The model evaluates five dimensions of service quality: **Reliability, Responsiveness, Assurance, Empathy and Tangibles**, by contrasting the **consumer expectations (E) and perceptions (P)**. The difference (P-E) represents the service quality gap indicating over- or under-performance on each of the dimension.

Methodology

A consumer survey dataset of 100 respondents (50 online users and 50 traditional pharmacy users) was constructed. Each participant rated expectations and perceptions for the five SERVQUAL dimensions on a 7-point Likert scale (1 = Strongly Disagree, 7 = Strongly Agree). Mean expectation (\bar{E}) and perception (\bar{P}) scores were computed followed by the Gap Score = ($\bar{P} - \bar{E}$) for each of the dimension.

Interpretation guidelines:

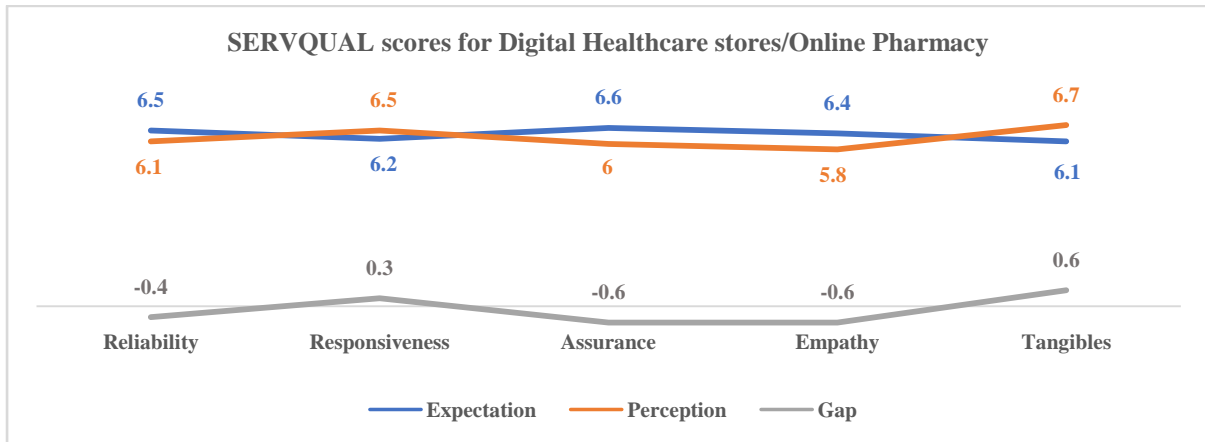
- **Positive gap:** Perceived performance exceeds expectations (delight).
- **Zero gap:** Performance meets expectations (satisfaction).
- **Negative gap:** Underperformance (dissatisfaction, trust risk).

Results

Table: SERVQUAL Scores for Digital Healthcare store / Online Pharmacy

Dimension	Expectation (\bar{E})	Perception (\bar{P})	Gap (P-E)	Interpretation
Reliability (Accuracy, timely delivery, correct medicine)	6.5	6.1	-0.4	Slight underperformance; reliability concerns
Responsiveness (Prompt reply, issue resolution)	6.2	6.5	+0.3	Positive gap; automation like chatbots and fast query resolution enhance satisfaction.
Assurance (Professional credibility, authenticity, safety)	6.6	6.0	-0.6	Consumers doubt on verification or authenticity online.
Empathy (Personalization, understanding needs)	6.4	5.8	-0.6	Lack of personal touch limits the perceived empathy.
Tangibles (Website interface, packaging, documentation)	6.1	6.7	+0.6	Excellent UX and packaging delight consumers.

Summary (Digital):

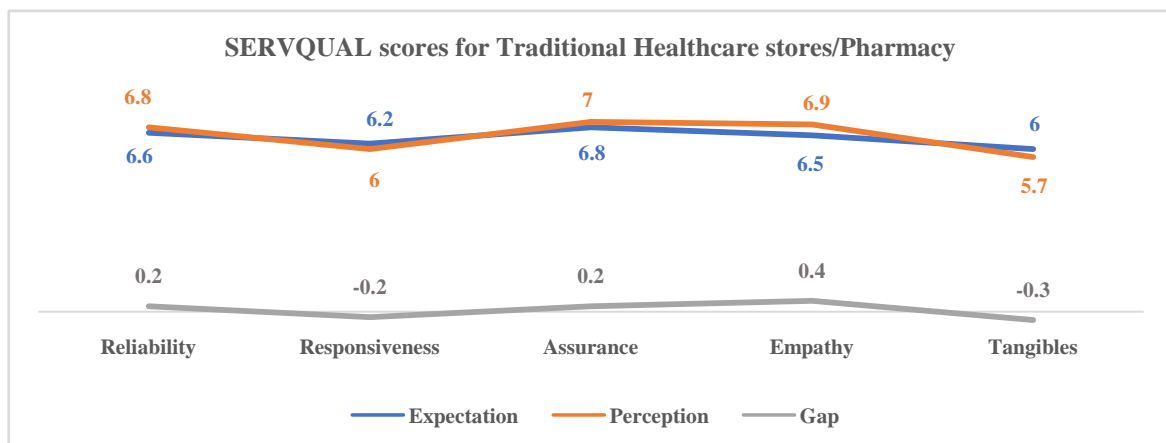


Overall mean gap = -0.14 indicating near satisfaction but trust-linked deficits in Assurance and Empathy. These two areas most strongly moderate the consumer preference for online pharmacies.

Table: SERVQUAL Scores for Traditional Healthcare stores/Pharmacy

Dimension	Expectation (E)	Perception (P)	Gap (P-E)	Interpretation
Reliability	6.6	6.8	+0.2	Store staff fulfil prescriptions accurately; strong reliability.
Responsiveness	6.2	6.0	-0.2	Occasional wait times or limited hours reduce responsiveness.
Assurance	6.8	7.0	+0.2	Store staff knowledge builds confidence and channel trust.
Empathy	6.5	6.9	+0.4	Personalized advice and health history recall drive satisfaction.
Tangibles	6.0	5.7	-0.3	Limited ambience or physical environment modernization.

Summary (Traditional):



Overall mean gap = +0.06, slightly positive, showing that expectations are met or exceeded, especially on Empathy and Assurance which are core to trust and consumer preference.

Hedonic Scale Analysis: Consumer Perception of Online vs. Traditional Healthcare store/Pharmacy

Conceptual Foundation

The Hedonic Scale is a psychometric instrument scaling that is used to capture the consumer responses, such as liking, preference or satisfaction towards a product or service. Unlike the objective metrics, the Hedonic Scale measures the consumer’s subjective enjoyment and emotional acceptance providing insight into how the consumers evaluate experiences at purchasing parameter levels.

In the context of pharmaceutical/healthcare products, hedonic evaluations extend beyond the factors like price or availability. Consumers form emotional judgments based on trust, convenience, privacy and product/service quality, which influence their channel preference, repeat purchase behaviour and channel selection (digital vs. traditional).

Methodology

For this study, the Hedonic Scale was applied to a sample of 100 respondents which was split evenly between digital/online and traditional healthcare store/pharmacy users. Respondents evaluated their experiences across the nine key dimensions for comparing the user experiences across the two channels of healthcare product marketing:

1. Accessibility and Convenience
2. Product Availability
3. Pricing and Discounts
4. Delivery and Time Efficiency
5. Customer Support and Consultation
6. Trust, Safety and Authenticity
7. Privacy and Discretion
8. User Experience and Technology
9. Ease of Product Returns

A 9-point Hedonic Scale was used for each dimension:

Point	Descriptor	Interpretation
9	Like extremely	Highest satisfaction; highly preferred
8	Like very much	Strong positive evaluation
7	Like moderately	Moderately positive evaluation
6	Like slightly	Mildly positive evaluation
5	Neither like nor dislike	Neutral; indifference
4	Dislike slightly	Mild dissatisfaction
3	Dislike moderately	Moderate dissatisfaction
2	Dislike very much	Strong dissatisfaction
1	Dislike extremely	Extreme dissatisfaction; reject the experience

Respondents were instructed to rate their experience for each of the above 9 dimensions separately for both digital/online and traditional

healthcare stores/pharmacies allowing a direct comparison of consumer perception across channels.

Table: Cross-Channel Comparison results on Hedonic scale based on Consumer Survey

Dimension	Digital / Online Pharmacy	Traditional Pharmacy
Accessibility and Convenience	High	Moderate
Product Availability	Moderate-High	High
Pricing and Discounts	High	Moderate
Delivery and Time Efficiency	High	Moderate
Customer Support and Consultation	Moderate	High
Trust, Safety and Authenticity	Moderate	Very High
Privacy and Discretion	High	High
User Experience and Technology	Very High	Moderate
Ease of Product Returns	Moderate	High

Net Promoter Score (NPS)

- **Purpose:** Measures consumer loyalty.
- **Procedure:** Respondents answer the questions like: “How likely are you to recommend this

product or service to the others?” on a 0–10 scale. Scores categorize the participants as

Promoters, Passives or Detractors enabling the NPS calculation per channel.

Customer Satisfaction Score (CSAT)

- **Purpose:** Measures transactionspecific satisfaction.
- **Procedure:** Respondents are asked to rate the satisfaction level associated with a product or service on a scale of 1–5 for their overall purchase experience, delivery, consultation and the product quality.

Customer Effort Score (CES)

- **Purpose:** Assesses the customer effort or the ease of use and perceived effort in purchasing or consulting.

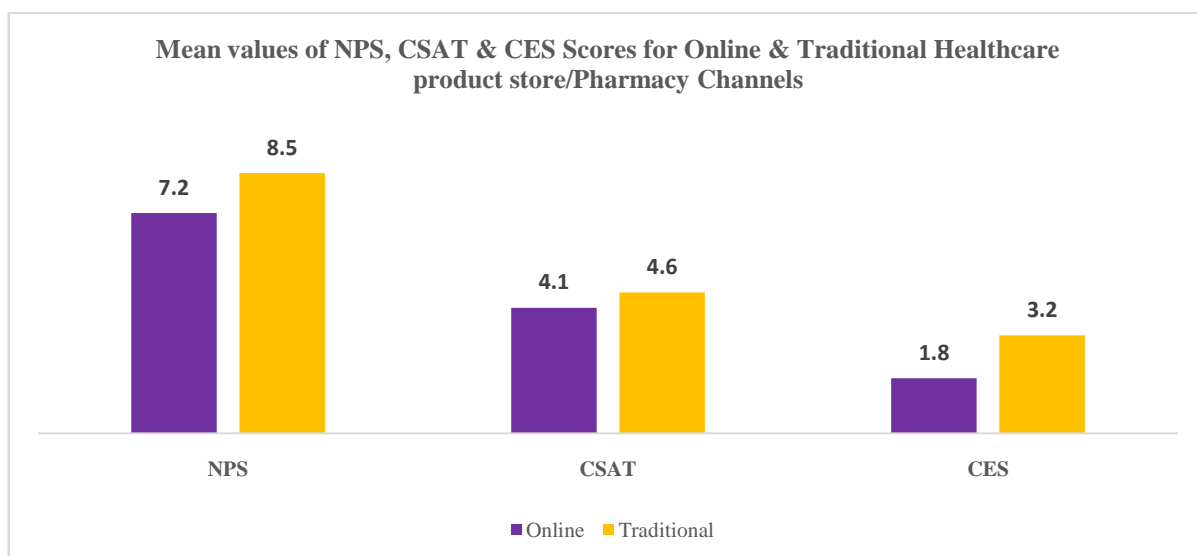
- **Procedure:** Respondents rate the effort required to complete the purchase process for the product or service on a 1–5 scale (1 = Very Low Effort, 5 = Very High Effort).

Sample Information

- **Sample size:**The sample size was of 100 respondents and the distribution was 50 onlineand 50 traditional
- **Metrics for measurement of ratings:**
 - **NPS:** 0–10 scale
 - **CSAT:** 1–5 Likert scale
 - **CES:** 1–5 Likert scale (1 = very low effort, 5 = very high effort)

Table: Survey Data (Summary Statistics)

Metric	Channel	Mean	Standard Deviation	Interpretation
NPS	Online	7.2	1.8	Moderate loyalty; convenience driven
	Traditional	8.5	1.2	High loyalty; trust driven
CSAT	Online	4.1	0.7	High satisfaction on functional aspects
	Traditional	4.6	0.5	High satisfaction across trust and consultation
CES	Online	1.8	0.6	Low effort; digital convenience appreciated
	Traditional	3.2	0.7	Moderate effort; offset by trust and guidance



IV. CONCLUSION:

The comparative analysis between digital healthcare stores/online pharmacies and traditional healthcare stores/pharmacies reveals a duality in the consumer perception: functional satisfaction versus the emotional assurance. Online platforms

excel in parameters like accessibility, convenience and user experience, confirming that technological efficiency drives the positive functional evaluations for the consumer perception. However, deficits in trust, authenticity and empathy remain the critical barriers to deepening channel loyalty. Consumers

appreciate the speed and privacy of digital platforms but remain cautious about the medicine authenticity and professional oversight.

Conversely, the traditional pharmacies sustain their advantage through their human-centred marketing attributes which are reliability, empathy and assurance, creating strong consumer relation bonds that enhance both the consumer trust as well as the channel preference. Despite some moderate limitations in accessibility and cost, the face-to-face relationship continues to dominate in areas where consumer's emotional trust and professional credibility are paramount.

From a strategic standpoint, the future of pharmaceutical/healthcare service excellence lies in hybrid integration, combining digital efficiency with the human empathy. Online channels can enhance the consumer's trust by implementing verified consultations, transparent licensing and strong privacy protections. Traditional channels on the other hand can adopt digital tools for automation, scheduling and real-time inventory to improve the functional convenience.

Ultimately, consumer trust and channel preference are not defined by the marketing channel alone but also by the equilibrium between technological reliability and consumer emotional assurance. Sustainable competitiveness in healthcare retail will emerge from harmonizing these two forces-transforming online channel and traditional channel into a cohesive and trust-centred experiences.

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