# Voice-Led Urges: Voice Assistants Shape Spontaneous Decisions in Voice Commerce

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**Abstract:** Growth of technology and innovation is inevitable. Using natural language processing along with machine learning, this technology allows voice assistants to detect user preferences. Voice assistants would suggest products that are suited to the user, smoothen the buying process, and show a user interface that is in tune with the user's way of shopping behavior. The innovation copes with the challenges of limited visual comparison by adding context-aware suggestions that improve the engagement of users and enhance their confidence in the purchase decisions made through voice interactions. Our study is multifaceted in its blend of survey and interview approaches, investigating the psychology and behavior of consumer interactions. The study emphasizes impulsive purchase behavior influenced by this personalized technology. The SEM methodology was used for data analysis and hypothesis testing in connection with the voice assistant's features and online consumer decision-making process. This research offers several useful insights regarding the still-evolving voice commerce and its implications for businesses to enhance user engagement and satisfaction with personalized online shopping. The study presents both an innovative framework for voice-assisted e-commerce and discusses the rich dynamics between technological development and consumer behavior in the digital marketplace.

**Type:** Research paper

## 1. Introduction

People are running behind the time and trying to balance their work and home. Allocating time for reading is very difficult for everyone. The growing number of voice-activated devices including Alexa and Siri together with Google Assistant has changed technology interfaces through hands-free operation modes in reading. Voice technology development requires a deeper investigation of its complex relationship with consumer impulses because consumers now rely on voice commands for both basic functions and purchasing operations (Kazim et al., 2022).

### 1.1. Voice Search in E-commerce: Transforming Consumer Behavior

Voice search technology creates fundamental changes in consumer technology interactions and online purchases according to Nagadeepa et al. (2022). Users now have convenience in information search and purchasing through voice commands because of virtual assistants like Alexa, Google Home, Siri, Cortana, and Amazon Echo. The paper examines how voice search transforms how consumers act both in their purchasing choices and when using online marketplaces (Pushpa et al., 2023).

### 1.2. The Evolution of Voice Search

Voice search promotes better accessibility because it enables individuals with disabilities along with people who struggle with text-based interfaces to communicate efficiently. The Microsoft survey demonstrated that voice search enables 40% of users to become more independent while gaining empowerment which positively affects diverse populations. The use of voice search causes online searchers to modify their behavior because they now form complex conversational queries instead of shorter text-based ones. Businesses must optimize their content because Google shows that 41% of adults conduct voice search queries every day. This makes clear the importance of adapting to these changing search behaviors by using long-tail keywords and specific queries.

### 1.3. Influence on Purchase Decision-Making

Instant results and voice-activated devices with increasing consumer demand for instant results from voice search, 58% of the population is reported to use voice search to get information about local businesses, requiring companies to incorporate local voice search in their online presence. There must be enough optimizations for local search, ensuring, along with this increased demand, that details given are accurate and request a short answer and accurate response (Nagadeepa et al., 2024). Voice search might influence purchasing decisions to a great extent where voice shopping Turn on (or off) any device or product, such as Alexa or Google Home besides shopping These devices have now regularly turned to the function of payment processing and the ability to set reminders and check on receipts.

## 1.4. Future of Voice Search in E-commerce: Developments, Challenges, and Case Studies

Rapid developments regarding AI and voice recognition technologies are outpacing e-commerce pursuits in this area. Such developments with better techniques at vast levels of accuracy, understanding nuances of natural language, etc., for prediction of user inclinations along with more comfort regarding shopping experiences. This spellbinding magic, though with high promises, now faces such issues as interpretable accuracy, i.e., getting complex questions formulated correctly, and also privacy from any watchful eye. Taking note of these recommendations would probably help businesses open up a trusting realm within users so that they can keep using this voice search technology for some time now.

## 1.5. Optimizing for Voice Search in E-commerce

Voice search stands as a revolutionary force in e-commerce, offering a compelling fusion of simplicity and engagement. Brands that adopt a voice-first commerce approach, addressing challenges and ensuring privacy, are poised to connect with customers in an exciting future of hands-free retail experiences.

## 1.6. Chapter Flow of the Study

This study follows a structured flow, beginning with an introduction that outlines the significance of voice assistant technology and its impact on online impulse buying behavior. The literature review provides a comprehensive overview of relevant theories and empirical studies. The methodology section details the mixed-methods approach, with a sample size of 350 participants and data collected through interviews and surveys. The survey explores preferred voice assistants, device usage, and the purpose of voice assistant usage. Subsequently, the study employs Structural Equation Modeling (SEM) for data analysis and hypothesis testing. The results are presented, discussing the regression findings and their implications on voice assistant technology's influence on online impulse buying behavior. The study concludes with a discussion of key insights, limitations, and avenues for future research, providing a structured and cohesive exploration of the research objectives.

# 2. Literature Review

## 2.1. Review of Previous Studies

The concept of instant gratification through seamless interaction in the context of voice assistants aligns with the psychological need for immediate rewards and minimal effort. Research by Limayem et al. (2014) suggests that technology that provides instant responses and minimizes user effort enhances user satisfaction and engagement. The convenience and efficiency of hands-free accessibility and real-time responses contribute to a positive user experience, fostering a sense of instant gratification.

- Hands-Free accessibility: Voice assistance provides a hands-free and convenient way for users to interact with online platforms (Chung et al., 2018). This accessibility eliminates barriers and encourages spontaneous

engagement, contributing to a seamless and immediate connection between users and the digital marketplace.

- Real-Time responses: The instantaneous responses provided by voice assistants cater to the human desire for immediate gratification (Xiao, 2013). When users express interest or make queries, the rapid and real-time feedback from the voice assistant fosters a sense of urgency, prompting impulsive decisions.

- Immediate responses*:* One of the key features of voice assistants is their ability to provide instant responses (Roslan et al., 2023). When a consumer expresses interest in a product or asks for recommendations, the immediate feedback from the voice assistant creates a sense of urgency and responsiveness, fostering impulsive decision-making.

The pursuit of personalization in technology interfaces has gained prominence in literature. Dellarocas et al. (2013) argue that personalized systems, driven by user profiling and learning algorithms, enhance user engagement by delivering content tailored to individual preferences. This personalization extends to voice assistants, where tailored suggestions and offers leverage user data to provide a more personalized and relevant experience, influencing user behavior (Kowatsch et al., 2019).

- User profiling and learning: Voice assistants leverage artificial intelligence to learn and build user profiles over time (Buhalis, 2022). By understanding individual preferences, behaviors, and purchase history, voice assistants can deliver highly personalized product recommendations. This personalization enhances the likelihood of users discovering items aligned with their tastes, fueling impulsive buying behavior (Setyani et al., 2019).

- Tailored suggestions and offers: Based on the accumulated user data, voice assistants can provide tailored suggestions and exclusive offers (Longo et al., 2017). These personalized prompts capitalize on individual preferences, creating a sense of uniqueness and exclusivity that can trigger impulsive purchases.

- Personalized recommendations: Voice assistants often leverage artificial intelligence to learn about users' preferences and behaviors over time (Malodia et al., 2021). This personalized approach results in tailored product recommendations based on past interactions, increasing the likelihood of users discovering items they may not have actively sought.

Frictionless transactional experiences, exemplified by voice-enabled purchases and one-click ordering, draw from the literature on e-commerce usability and convenience. Prior studies (Liang and Lai, 2000) emphasize the importance of reducing transactional friction to enhance the user experience. In the context of voice commerce, the seamless execution of transactions through voice commands contributes to a frictionless process, influencing consumer behavior positively (Huang et al., 2018).

- Voice-enabled purchases*:* The integration of voice assistants with e-commerce platforms facilitates voice-enabled transactions (West, 2022). Users can effortlessly initiate purchases through verbal commands, minimizing the friction between product discovery and transaction

completion. This streamlined process encourages impulsive buying by reducing barriers to immediate action.

- One-click ordering: Some voice assistants offer one-click ordering features, further simplifying the transaction process (Burke, 2002). With just a vocal command, users can swiftly move from expressing interest in a product to confirming the purchase. The ease of this one-click approach amplifies the impulsive nature of buying decisions.

The limitations in visual comparison inherent in voice-driven interactions and the associated fear of missing out (FOMO) draw on behavioral psychology and consumer behavior literature. Tversky and Simonson (1993) highlight the impact of the visual presentation of choices on decision-making. In the absence of visual cues, voice-driven interactions may limit the user's ability to compare options visually, potentially heightening the influence of FOMO as users may feel compelled to make quicker decisions (Dholakia et al., 2004).

- Visual limitations in voice-driven interactions: Voice interactions inherently lack the visual component that traditional online shopping provides (Suh, 2006). This limitation reduces the ability of users to visually compare products and options. As a result, consumers may rely more on the voice assistant's descriptions and recommendations, increasing the likelihood of impulsive decisions.
- Fear of missing out (FOMO): Voice assistants can deliver real-time information about limited-time offers, flash sales, or exclusive promotions (Lamba, 2021) The immediacy of these notifications, coupled with the fear of missing out on a time-sensitive opportunity, serves as a powerful trigger for impulsive purchases.

## 2.2. Objectives

The objectives of this paper are: (1) To examine the impact of hands-free accessibility provided by voice-assisted technology on online impulse buying behavior; (2) To assess the influence of user profiling and learning capabilities of voice assistants on online impulse buying behavior; (3) To investigate the relationship between voice-enabled purchases facilitated by voice assistants and online impulse buying behavior; and (4) To explore the impact of visual limitations in voice-driven interactions and fear of missing out (FOMO) triggers on online impulse buying behavior.

Based on the objectives the following hypotheses were framed

H1: There is a significant positive relationship between hands-free accessibility provided by voice-assisted technology and online impulse buying behavior.

H2: User profiling and learning capabilities of voice assistants have a positive impact on online impulse buying behavior.

H3: Voice-enabled purchases facilitated by voice assistants positively influence online impulse buying behavior.

H4: Visual limitations in voice-driven interactions and fear of missing out (FOMO) triggers presented by voice assistants lead to a positive association with online impulse buying behavior.

## 3. Methodology

This study employed a mixed-methods approach to comprehensively investigate the relationship between voice assistant technology and online impulse buying behavior. The sample size consisted of 350 participants, and data were collected through a combination of in-person interviews and surveys conducted via social media platforms. The dual data collection methods aimed to capture a diverse range of responses and ensure a representative sample. The survey included questions related to preferred voice assistant, type of device usage, and the purpose of voice assistant utilization. Subsequently, Structural Equation Modeling (SEM) was applied to analyze the collected data, allowing for a robust examination of complex relationships among variables. The SEM framework facilitated hypothesis testing, providing statistical insights into the specific dimensions of voice assistant technology that influence online impulse buying behavior. This mixed-methods approach, combining qualitative and quantitative data collection with SEM analysis, ensured a comprehensive exploration of the research objectives.

## 4. Data Analysis

The demographic analysis of 350 respondents provides valuable insights into the diverse composition of the study sample. Notably, the even distribution across age groups ensures that findings will be representative of a broad age range, contributing to the generalizability of the study. The slight male majority in gender representation suggests potential gender-specific patterns in voice assistant usage and online impulse buying behavior. The occupational diversity, including students, employed individuals, and retirees, signifies that the study captures perspectives from various life stages. The mix of income levels allows for an examination of how voice assistant impact may vary across economic brackets. The educational background, particularly the prevalence of respondents with bachelor's and master's degrees, indicates a sample with diverse knowledge and technology literacy levels. The geographical spread across urban, suburban, and rural areas ensures a nuanced understanding of regional influences on voice assistant usage. The detailed distribution of demographic data is given in Table 1.

**Table 1:** Demographic distribution

| Demographics and its Options | | Distribution (in %) |
|---|---|---|
| Age | 18-24, 25-34, 35-44, 45-54, 55 and above | 15, 20, 25, 20, 20 |
| Gender | Male, Female, Other | 45, 50, 5 |
| Occupation | Student, Employed, Unemployed, Self-employed, Retired | 20, 40, 10, 15, 15 |
| Income Level | Below $25K, $25K-$50K, $50K-$75K, $75K-$100K, Above $100K | 10, 20, 25, 20, 25 |
| Education Level | High School, Some College, Bachelor's, Master's, Doctorate | 10, 20, 25, 30, 15 |
| Location | Urban, Suburban, Rural | 40, 30, 30 |

Table 2 illustrates the distribution of respondents' preferences regarding voice assistant technology.

**Table 2:** Preference of voice assistant, device, and purpose

| Preferred Voice Assistant | | Type of Device for Voice Assistance | |
|---|---|---|---|
| Alexa | 30 | Smartphone | 40 |
| Siri | 25 | Smart speaker | 25 |
| Google Assistant | 25 | Smartwatch | 15 |
| Cortana | 10 | Laptop/Desktop | 10 |
| Other | 10 | Other | 10 |
| **Purpose of Voice Assistant Usage** | | | |
| Information queries | 25 | Online shopping | 20 |
| Setting reminders or alarms | 20 | Smart home control | 10 |
| Making calls | 15 | Entertainment | 10 |

Notably, the majority (30%) favor Alexa, followed by Siri and Google Assistant at 25% each, while Cortana and other voice assistants constitute the preferences of 10% each. In terms of device usage, smartphones emerge as the most popular choice, selected by 40% of respondents, indicating the widespread integration of voice assistants into daily mobile interactions. Smart speakers follow at 25%, reflecting their growing popularity. The purpose of voice assistant usage reveals diverse functionalities, with 25% employing them for information queries, 20% for setting reminders, and another 20% for online shopping, emphasizing the multifaceted role of voice assistants in users' lives. This distribution provides valuable insights into the varied preferences and applications of voice assistant technology among the surveyed population.

This study employs Structural Equation Modeling (SEM) as a robust statistical framework to analyze complex relationships among observed and latent variables. SEM enables a comprehensive examination of the proposed model, with a focus on assessing the model fit through various indices, providing a rigorous foundation for understanding the interplay of factors within the study framework. Table 3 shows the present study's model fit indices.

**Table 3:** Model fit of the measurement model

| Fit Indices | CMIN/DF | P | GFI | AGFI | NFI | CFI | RMSEA |
|---|---|---|---|---|---|---|---|
| Model Value | 3.729 | 0.078 | 0.921 | 0.934 | 0.932 | 0.938 | 0.075 |

The model fit indices suggest that the specified model demonstrates an overall good fit to the observed data. The comparative fit index (CFI) and normed fit index (NFI) both exceed the recommended threshold of 0.90, indicating a satisfactory fit. The goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) scores are also notably high, standing at 0.921 and 0.934, respectively, further supporting the adequacy of the model. The chi-square to

degrees of freedom ratio (CMIN/DF) is 3.729, which, although slightly above the ideal threshold of 3, remains within an acceptable range, considering the other fit indices. The root mean square error of approximation (RMSEA) is low at 0.075, indicating a close fit between the hypothesized model and the observed data. In summary, based on these fit indices, the model appears to provide a credible representation of the relationships within the data.

The regression results reveal significant associations between voice assistant technology and online impulse buying behavior across various dimensions which is shown in Table 4.

**Table 4:** Voice assistant technology and online impulse buying behavior

| Path | | | | SE | S.E. | C.R. | P |
|---|---|---|---|---|---|---|---|
| H1 | Online impulse buying behavior | ← | Instant Gratification through Seamless Interaction | .233 | .049 | 4.765 | .000 |
| H2 | | | Personalization and Tailored Recommendations | .110 | .055 | 1.990 | .047 |
| H3 | | | Frictionless Transactional Experience | .126 | .505 | 2.248 | .025 |
| H4 | | | Limited Visual Comparison and FOMO Triggers | .436 | .044 | 9.254 | .000 |

Starting with Hypothesis 1, the path from instant gratification through seamless interaction to online impulse buying behavior is found to be significant ($\beta$ = 0.233, p < 0.001, C.R. = 4.765). This indicates that users who experience instant gratification through hands-free accessibility and real-time responses are more likely to engage in online impulse buying. Moving to Hypothesis 2 (H2), the relationship between personalization and tailored recommendations and online impulse buying behavior is marginally significant ($\beta$ = 0.110, p = 0.047, C.R. = 1.990). This suggests that personalized suggestions and tailored recommendations contribute, albeit modestly, to the propensity for online impulse buying. In alignment with Hypothesis 3 (H3), the path from frictionless transactional experience to online impulse buying behavior is statistically significant ($\beta$ = 0.126, p = 0.025, C.R. = 2.248). It implies that a seamless and hassle-free transactional experience, facilitated by voice-enabled purchases and one-click ordering, positively influences online impulse buying. Supporting Hypothesis 4 (H4), a limited visual comparison and FOMO Triggers exhibit a strong and significant association with online impulse buying behavior ($\beta$ = 0.436, p < 0.001, C.R. = 9.254). This underscores that the absence of visual comparison and the presence of fear of missing out (FOMO) triggers significantly contribute to the likelihood of engaging in online impulse buying behavior. Overall, these findings provide nuanced insights into the specific dimensions of voice assistant technology that impact online impulse buying behavior.

## 5. Conclusion

This study sheds light on the intricate relationship between voice assistant technology and online impulse buying behavior, uncovering key insights that hold implications for both consumers and businesses. The findings highlight the significance of instant gratification through seamless interaction, personalized recommendations, frictionless transactional experiences, and the absence of visual comparisons as influential factors in driving impulsive online purchases through voice assistants. The distribution analysis underscores the popularity of certain voice assistants, predominantly Alexa, and the prevalence of smartphone usage for voice assistance, emphasizing the diverse purposes for which consumers employ this technology. However, the study is not without limitations. The reliance on self-reported data introduces the potential for response bias, and the cross-sectional nature of the research limits causal inferences. The sample, while diverse, may not fully capture certain demographic nuances. Privacy concerns associated with voice assistant technology, a notable aspect in the consumer landscape, were not extensively explored and warrant further investigation.

Future research endeavors could delve into the privacy dimensions of voice assistant usage, addressing concerns and understanding how privacy perceptions influence consumer behaviors. Exploring cultural variations in the adoption and impact of voice assistants could provide a more global perspective. Longitudinal studies may offer insights into the evolving nature of voice technology's influence on consumer behavior over time. Additionally, considering the dynamic technological landscape, research focusing on emerging voice technologies and their implications could be a valuable avenue for exploration. Overall, this study opens avenues for further inquiry into the evolving intersection of voice assistant technology and consumer behavior.

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