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Evaluating User Experience And Interaction Design Efficiency Of Self-Ordering Kiosks In Quick Service Restaurants In Delhi NCR

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Abstract: Self-ordering kiosks (SOKs) are rapidly reshaping service interaction models in quick-service restaurants (QSRs), offering customers independence, convenience and reduced waiting times. However, their effectiveness depends heavily on intuitive interaction design and the ability to accommodate diverse user needs in real-world scenario. This study evaluates the user experience (UX) and interaction design efficiency of self-ordering kiosks in QSRs across Delhi NCR, an urban region characterized by high digital adoption and demographic diversity. Using a mixed-methods approach, data was collected through an online survey (n=115) and in-store observations with short interviews (n=8). Quantitative results indicate that perceived ease of use (PEOU) has a stronger influence on user satisfaction and intention to use than perceived usefulness (PU), suggesting that frictionless interaction is the primary driver of kiosk acceptance. Qualitative findings reveal three dominant behavioral patterns: kiosks enable younger users to bypass social interaction, group ordering creates cognitive load due to linear interface flows, and older users experience exclusion due to low digital comfort. The study confirms both hypotheses, PU predicts intention to use and PEOU predicts satisfaction, while also highlighting a digital divide shaped by age and literacy. These insights emphasize the need for hybrid service models and more inclusive kiosk designs that support varied demographic and contextual use cases. The results contribute to interaction design research by linking behavioral acceptance with real-time interaction outcomes in an emerging market context.

Keywords: Self-ordering kiosks; User experience; Interaction design; Quick-service restaurants; Human–computer interaction

I. Introduction

Self-ordering kiosks are increasingly shaping the way customers interact with quick-service restaurants, offering a fast, convenient, and contactless ordering experience. By allowing users to customize orders, make payments, and confirm selections independently, these kiosks not only enhance operational efficiency but also influence customer satisfaction and perceived service quality. The success of SOKs, however, depends on more than just technology, it relies on intuitive interaction design, accessibility, and the ability to accommodate diverse user needs in real-world environments.

In the context of Delhi NCR, a densely populated urban region with a highly diverse customer base, understanding the interplay between kiosk design, user experience, and behavioural adoption is critical. Factors such as digital literacy, language preferences, and familiarity with technology can significantly impact how users engage with self-service systems. Despite growing global research on SOKs, there is limited India-specific evidence that examines both **behavioural intention** and **interaction efficiency** in real-world QSR settings.

This study addresses this gap by evaluating the UX and interaction design efficiency of SOKs in Delhi NCR's quick-service restaurants, with a focus on how design, usability, and contextual factors shape user adoption, satisfaction, and performance.

II. Aim

To evaluate the user experience and interaction design efficiency of self-ordering kiosks in quick-service restaurants in Delhi NCR, and to understand how design, usability, and contextual factors influence users' adoption, satisfaction, and performance.

III. Objectives

1. **Examine Technology Acceptance:** Investigate how perceived usefulness and perceived ease of use influence customers' intention to use self-ordering kiosks.
2. **Assess Interaction Design Factors:** Identify which design elements affect task efficiency and user satisfaction.
3. **Understand Demographic Influence:** Analyse how user characteristics affect comfort, efficiency, and adoption of self-ordering kiosks.

IV. Literature Review

4.1. Introduction

A self-ordering kiosk is a self-service machine that empowers customers to make their own food orders directly at a touchscreen kiosk without the involvement of a restaurant cashier or waiter. Customers can customize their orders, make payments, and get receipts through the self-service kiosk. Self-ordering machines can be deployed in several locations and in different forms. The machines function particularly well in quick-service restaurants, fast food places, and casual dining establishments with heavy foot traffic, but any type of restaurant can make use of such machines, as an additional fast sales channel. From a human-centered design perspective, the success of these kiosks depends not only on their technological functionality but also on how intuitively users can navigate and interact with them. (SEDCO, n.d.)

In chain restaurants, they feature a touchscreen, app-like menus with customization options and multiple payment methods. As identified by Kim, Lee, & Qu (2021), self-service kiosks in QSRs significantly influence user experience and operational performance. When paired with mobile ordering or point-of-sale (POS) systems, they support a seamless omnichannel experience. While the kiosk hardware and software can vary in screen size, payment modules, and accessibility features; their core purpose remains consistent, i.e., enabling fast, self-directed ordering in high-volume food-service environment.

The adoption of SOKs has grown rapidly over the past decade, accelerated by the pandemic-driven demand for contactless interactions. They enhance operational efficiency by reducing queue times, increasing average order value through upselling, and improving order accuracy, as customers confirm their selections directly through kiosks. However, poorly designed interfaces, accessibility gaps, payment friction, and social pressure can compromise both user satisfaction and business outcomes.

Drawing on both empirical and practitioner studies, this review analyses SOK adoption, user experience (UX), and interaction efficiency, with a specific focus on Delhi NCR. It also highlights gaps in India-specific evidence, particularly regarding objective task-level metrics such as time-on-task, error rates, and support interventions. The following sections review existing literature on technology adoption, user experience, and operational efficiency of self-ordering kiosks to situate this study within the broader research landscape.

4.2. Thematic Literature Synthesis

4.2.1. Adoption & Behavioral Models

Studies on SOK adoption often rely on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT/UTAUT2). These models explain how perceived usefulness, ease of use, and contextual factors, such as social influence, habit, and facilitating conditions shape user behaviour. Research from Malaysia, Taiwan, and Korea (Ayob & Baba, 2025; Huang et al., 2019; Kim, Lee, & Qu, 2021) indicates that convenience and speed drive adoption, but technology anxiety and social cues influence repeated use. In India, factors like digital payment readiness and bilingual interfaces are particularly

important for sustained engagement. (GrabOn, 2025)

4.2.2. UX & Interaction Design Factors

User experience determines how effectively kiosks support ordering tasks. Core principles like clarity, simplicity, error tolerance, and cognitive economy (Krug, 2014; Norman, 2013; Lidwell et al., 2003; Ayob & Baba, 2025) should be included. Interfaces should also provide clear feedback, intuitive touch-action mapping, and minimize cognitive load. Visual hierarchy, menu depth, and font legibility influence task completion and satisfaction, while step-by-step ordering prevents cognitive overload. Eye-tracking studies reveal an "F-pattern" scanning behaviour, guiding optimal placement of call-to-action buttons (Nielsen, 2006). Accessibility considerations, such as font size, contrast, and language options are essential, particularly in crowded, noisy environments where kiosks are generally used.

4.2.3. Operational Efficiency & Business Impacts

SOK adoption aligns with operational objectives, that are, reducing queue times, improving order accuracy, and increasing sales. Research and industry reports suggest that self-ordering kiosks can substantially reduce service times and improve throughput by streamlining order placement and payment processes. Visual merchandising and persuasive design can encourage additional purchases, known as the "digital upsell effect" (Hefer & Cant, 2013). Efficiency depends on system reliability and interface clarity; transaction delays or payment failures reduce perceived convenience and deter revisit intention. Queue perception also matters, and so, visible kiosks can reduce perceived waiting, but excessive or confusing layouts may create congestion (Kim et al., 2021) and thus, make the kiosks less efficient.

4.2.4. Cultural & Regional Adaptation

In India, kiosk usability is influenced by digital literacy, language diversity, and payment infrastructure. Bilingual UIs (English & Hindi) and clear visual cues significantly improve task completion among first-time users (Iyer & Sharma, 2025). Usage patterns in Delhi NCR vary, i.e., younger customers prefer kiosks for speed and privacy, whereas older or less digitally confident users seek staff assistance. Also, as of March 2025, GrabOn (2025) reports over 491 million active UPI users in India, indicating strong digital payment literacy which supports kiosk adoption. Environmental factors like crowding, noise and glare also affect interactions, as mentioned above. Ergonomic adjustments such as adjustable screen tilt, larger touch targets, and localized imagery enhance accessibility. Additionally, cultural norms may favour brief human validation during payment or pickup, making hybrid models with guided prompts more effective.

4.2.5. Design Frameworks & Principles

Human-Computer Interaction (HCI) literature provides theoretical guidance for SOK design. Norman emphasizes affordances, feedback, and error recovery (Norman, 2013); Krug highlights intuitive layouts (Krug, 2014); Lidwell et al. summarize universal design principles such as Hick's Law and Fitts's Law (2003). Key heuristics include:

- Visibility of system status (e.g., loading, confirmation)
- Consistency in buttons, color codes, and feedback
- Error prevention with confirmation prompts and undo options
- Recognition over recall using icons and imagery for low-literacy users

In addition to these interaction-design factors, the well-known Nielsen's (1994) ten usability heuristics provide a robust heuristic framework for evaluating kiosk interfaces in terms of system status visibility, feedback, and error prevention.

4.3. Theoretical Foundation

This study draws on TAM and UTAUT2 to examine SOK adoption in Delhi NCR.

4.3.1. Technology Acceptance Model (TAM)

Technology Acceptance Model was developed in 1986. It proposes that perceived usefulness and perceived ease of use determine behavioral intention (Davis, 1989). For SOKs, PU reflects whether the kiosk improves ordering speed, accuracy, or convenience, while PEOU reflects navigation ease. Research confirms these

constructs predict usage frequency and satisfaction (Huang et al., 2019; Kim et al., 2021).

The Technology Acceptance Model is based on the Theory of Reasoning and Action (TRA), which examines customer acceptance of technology based on attitudes, perceived utility, and ease of use (Ofori and Appiah Nimo, 2019). Furthermore, the technology acceptance strategy focuses on the qualities of information technology as regarded in terms of the level of ease and benefits of technology (Maqbool, 2018). According to Yongpin Zhoing, Segu Oh, and Hee Cheol Moon, the major aspects of the original TAM that support the acceptance of new technology are utility and usability (Yongpin et al., 2021).

Tahar in 2020 states that the most important aspect of user adoption of a system is perceived usefulness according to the TAM. The overall benefit of the model is improving user performance is a set of factors that affect how helpful people are. Jamil explained in 2019 that perceived usefulness is the extent to which a person considers that using a specific technology system will increase productivity, performance, and efficiency. It is the extent to which a person believes technology will improve their job performance or make their life simpler.

Perceived usefulness is a significant factor in determining the level of acceptance of self-service technologies. It is regarded as the main indication of an individual's attitude toward the technology and intent to employ it. People are more likely to embrace technology if they perceive it will be advantageous (Wei and Yu, 2023). Cho in 2011, as cited by Jamil in 2019, utilized perceived usefulness in self-service technology research and analysed its adoption in various contexts. The results indicate that perceived usefulness correlates significantly with consumer attitudes.

On the other hand, perceived ease of use, as discussed by Da Costa in 2019, is an individual's evaluation of the system's usability (Davis, 1989). The degree of complexity that comes with employing a specific technology is the user's perception of the technology's simplicity of use (Wei and Yu, 2023). Apparently, the individual's perception of the degree of effort required to use the system is reflected in their perception of the system's simplicity of use (Park et al., 2018).

Meanwhile, Rashid in 2021 cited that perceived usefulness is the idea of determining whether people are more inclined to use a particular solution if they understand that it will help them perform their task easier and ease of use is the dimension of how easy it is to use this solution. Rashid further stated that the most significant constructs for predicting the usage of a system are perceived usefulness and ease of use (Rashid, 2021). Therefore, it can be argued that individuals will be motivated to use self-service technology if they see its potential to help them solve problems. However, to retain someone looking for a self-service solution, using this support should look simply and have clear instructions.

4.3.2. Unified Theory of Acceptance and Use of Technology 2

Unified Theory of Acceptance and Use of Technology or UTAUT2 is a framework proposed by Venkatesh et al. (2003) to predict technology acceptance in an organization setting. There are four constructs of UTAUT, which are "performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC)" that influence behavioral intention and use behavior. The relationship between the UTAUT2 construct and the behavioral intention was proposed to be moderate by "age, gender, experience, and voluntariness" (Venkatesh et al., 2003).

UTAUT2 extends TAM by incorporating hedonic motivation, habit, social influence, and facilitating conditions (Venkatesh et al., 2012). Adoption depends on comfort with automation, trust in digital payments, and habitual ordering (Ayob & Baba, 2025; Kim et al., 2021**).** In Delhi NCR, social influence, bilingual interfaces, and novelty-driven enjoyment shape engagement.

4.3.3. Integration for the Current Study

The study combines TAM and UTAUT2 into a hybrid framework:

- Retaining PU and PEOU to assess instrumental usability
- Incorporating social influence, hedonic motivation, habit, and facilitating conditions to capture contextual and emotional factors
- Integrating UX metrics (task time, error rate, satisfaction, help requests) to link behavioural intention with interaction performance

To address the methodological gap, this study incorporates both self-report measures (e.g., satisfaction, intention) and objective UX metrics (task completion time, error rates, help-requests, and system logs) to provide a richer picture of interaction efficiency.

While TAM effectively captures instrumental factors like perceived usefulness and ease of use, UTAUT2 enriches this by incorporating hedonic motivation, habit formation, and facilitating conditions, key to understanding kiosk interaction where emotional, habitual and contextual factors matter. Thus, the hybrid model better explains both initial adoption and sustained use of SOKs.

This approach evaluates both adoption and actual interaction efficiency, bridging theory and practice.

4.4. Identified Research Gaps

Despite extensive global research on SOKs, gaps remain in India:

- **Limited India-based studies:** Most originate from developed markets and overlook regional factors such as language, payment habits, and digital literacy.
- **UX-performance linkage:** Few studies correlate perceived usability with actual performance.
- **Interface design efficiency:** Layout clarity, feedback mechanisms, and menu navigation remain underexplored.
- **Accessibility and inclusivity:** Public-use kiosks serve diverse populations, yet systematic evaluation of screen height, touch targets, language options, or audio guidance is lacking.
- **Scarcity of mixed-method research:** Studies seldom combine field observation, usability testing, and analytics for triangulated insights.

Given the scarcity of mixed-method research in the SOK domain, this study addresses that gap by combining field observation, usability testing, and kiosk log analytics in a Delhi NCR QSR context.

4.5. Summary

Global research has examined SOK adoption through TAM and UTAUT2, but India-specific, UX-centred evidence is limited. Most studies focus on adoption and perceived usefulness, with little emphasis on interaction efficiency, usability, or inclusivity. By integrating behavioural frameworks with usability testing and field observation, this study evaluates both user experience and interaction efficiency in Delhi NCR's QSRs. The findings aim to bridge theoretical adoption models with practical design insights, supporting human-centred, inclusive, and efficient kiosk systems.

Conducting this research in Delhi NCR is significant because India's multilingual population, high mobile-payment penetration and dense urban restaurant environment offer a unique test-bed for self-ordering kiosk research, findings will thus contribute both locally and globally by highlighting how socio-cultural and infrastructural factors shape kiosk UX in emerging-market contexts.

V. Research Questions & Hypotheses

5.1. Research Questions

Building on the literature review and identified research gaps, this study aims to explore the relationship between perceived usability, user experience, and interaction efficiency in self-ordering kiosks used in Delhi NCR's quick-service restaurants. The following research questions guide the investigation:

RQ1. How do perceived usefulness and ease of use influence users' intention to use self-ordering kiosks in Delhi NCR's quick service restaurants?
RQ2: What specific interaction design factors (such as navigation flow, layout clarity, and feedback) affect the efficiency and satisfaction of kiosk use?
RQ3: How do user demographics (age, digital literacy, and prior experience) impact their comfort and success when using self-ordering kiosks?

5.2. Hypotheses

Drawing from the Technology Acceptance Model, the study proposes the following hypotheses:

H1: If users perceive self-ordering kiosks as useful, then they will show a stronger intention to use them.
H2: If users find the kiosks easy to use, then they will feel more satisfied with their interaction experience.

5.3. Conceptual Linkage

This study connects the Technology Acceptance Model with user experience and interaction efficiency to understand self-ordering kiosk use in Delhi NCR's QSRs. Perceived usefulness and perceived ease of use form the core constructs influencing users' intention and satisfaction.

H1 and RQ1 link PU with the intention to use kiosks, while H2 and RQ2 connect PEOU with satisfaction and interaction quality. RQ3 extends this framework by examining how demographic and contextual factors such as age, digital literacy, and prior experience affect user comfort and success.

Together, these linkages bridge technology acceptance with practical UX evaluation, guiding both theoretical understanding and design improvement.

VI. Research Methodology

This study adopts a mixed-methods approach, integrating quantitative and qualitative methods to evaluate the UX and interaction design efficiency of SOKs in Delhi NCR's QSRs. This design enables a comprehensive understanding of both behavioural intention and actual user interaction.

6.1. Research Design

A convergent mixed-methods design is used:

- **Quantitative component**: Surveys to measure perceived usefulness, ease of use, intention to use, and satisfaction.
- **Qualitative component**: Observations and interviews to capture real-time behavior, interaction challenges, and contextual influences.

6.2. Study Setting and Participants

6.2.1. Setting

The research was conducted in the context of three major QSR brands in Delhi NCR, that are, McDonald's, Burger King and KFC, where self-ordering kiosks are operational and widely used. Observational data was collected in-store across these three outlets, while survey data was collected online from kiosk users located within the Delhi NCR region.

6.2.2. Participants

- **Quantitative (survey):** A total of **114 respondents** participated in the online survey. The survey was open to customers across all age groups. Participation was voluntary and based on convenience sampling, targeting individuals who had used a self-ordering kiosk at least once in a QSR setting.
- **Qualitative (observations and interviews):** For the qualitative component, **8 participants** were consensually observed while interacting with kiosks inside the three QSR outlets and were invited for short post-use interviews. Participants represented variation in age and levels of digital literacy, allowing the study to capture behavioural differences between confident users and those requiring assistance.

6.3. Data Collection Methods

6.3.1. Survey (Quantitative)

- A structured questionnaire captured:
  - Perceived usefulness
  - Perceived ease of use
  - Behavioural intention to use
  - Satisfaction
- Survey has also collected demographic information, including age, digital literacy, and prior experience with SOKs.

Note: Full survey questionnaire and responses are attached in the appendix.

6.3.2. Observations with Interviews (Qualitative)

- Qualitative research took place with observation and interview with participants interacting with kiosks to note:
  - Task completion strategies
  - Errors or navigation difficulties
  - Environmental factors such as crowding, noise, and lighting
  - Behavioural cues like hesitation or social influence
  - Suggestions for improvement

- Observations and interviews are recorded using structured checklists, field notes and questionnaire.

Note: Pictures, videos and responses are attached in the appendix.

6.4. Data Analysis

- **Quantitative data**: Descriptive statistics, correlation analysis, and regression models will examine relationships between PU, PEOU, satisfaction, and behavioral intention.
- **Qualitative data**: Thematic analysis will identify recurring patterns, usability challenges, and contextual factors.
- **Integration**: Quantitative and qualitative findings will be triangulated to provide a holistic understanding of SOK interaction efficiency.

6.5. Ethical Considerations

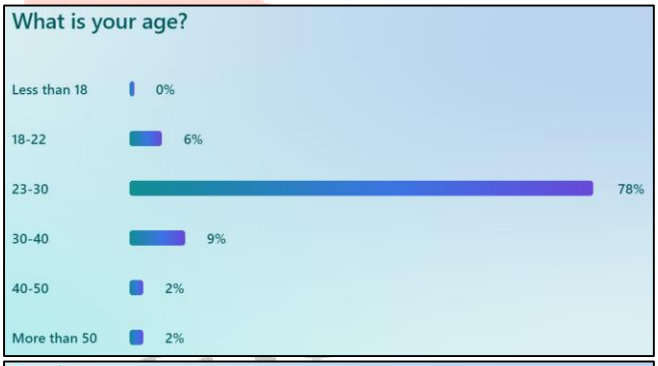
- Informed consent is obtained from all participants.
- Participants' privacy and confidentiality is strictly maintained.
- Observational and interview data is anonymized, and participation was voluntary.

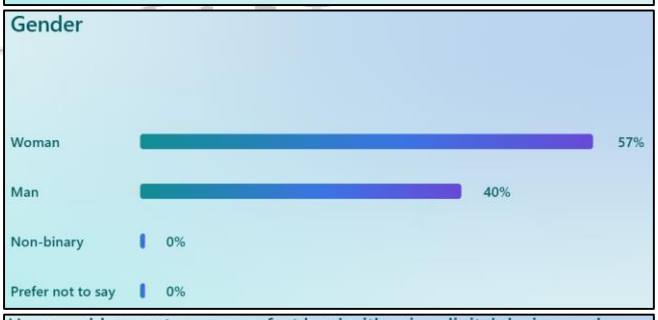
VII. Results and Discussion

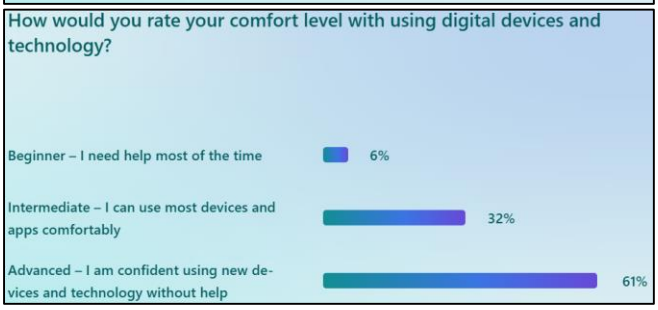
7.1. Results

7.1.1. Profile of the Digital Consumer

The demographic data provides a clear snapshot of the primary user base for SOKs in Delhi NCR. The study engaged 115 survey respondents and 8 observational participants. The resulting sample is heavily skewed towards a younger, digitally native demographic, with **78.3% of respondents falling within the 23–30 age bracket**. This dominance of the "Millennial" and "Gen Z" cohorts is further reflected in the digital literacy statistics, where **61.7% identified as 'Advanced' users**, confident in adopting new technology without assistance. Conversely, the older demographic (50+ years) represented a marginal fraction of the sample (2.6%), highlighting a potential self-selection bias where older consumers may actively avoid SOK-equipped restaurants or the kiosks themselves.



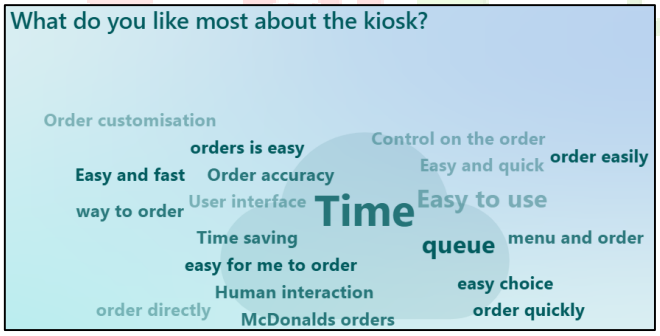


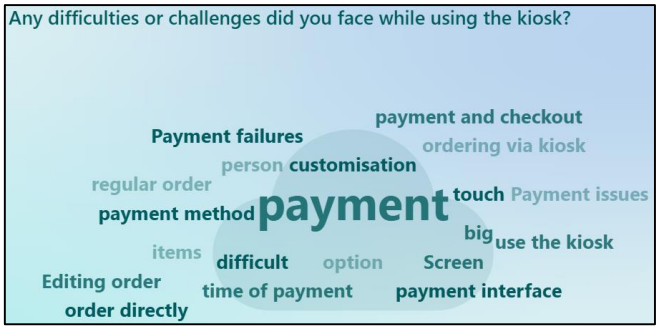


7.1.2. Quantitative Analysis of User Sentiment

Descriptive analysis of the survey data reveals that the reception of SOKs is largely positive but nuanced.

- **High Adoption Intent:** The construct of "Intention to Use" received the highest mean score (M=4.08), indicating that for the majority of the sample, the kiosk has successfully transitioned from a novelty to a preferred method of ordering.
- **The primacy of Ease:** Participants rated **Perceived Ease of Use** (M=3.95) slightly higher than **Perceived Usefulness** (M=3.91). Theoretically, this suggests that the primary value proposition of the kiosk is not that it provides better options (utility), but that it removes friction from the transaction.
- **The Satisfaction Metric:** Overall satisfaction remains high (M=3.91), correlating strongly with the user's digital literacy level. Advanced users reported near-perfect satisfaction, whereas beginner users reported significantly lower scores (M=3.00), quantitatively proving that the current interface design favors the tech-savvy.





7.1.3. Qualitative Findings: Behavioural Themes

The observational data and semi-structured interviews (Participants P1–P8) provided the "thick description" necessary to interpret the statistical trends. Three major themes emerged from the thematic analysis:

7.1.3.1. The Privacy Paradox and Social Avoidance

A dominant theme among the younger participants was the utilization of kiosks as a mechanism for social avoidance.

- **Observation:** Participant 1 (male, 23-24) explicitly stated, "I don't like talking to the cashier," valuing the kiosk because it allowed him to order "without interacting with anyone".

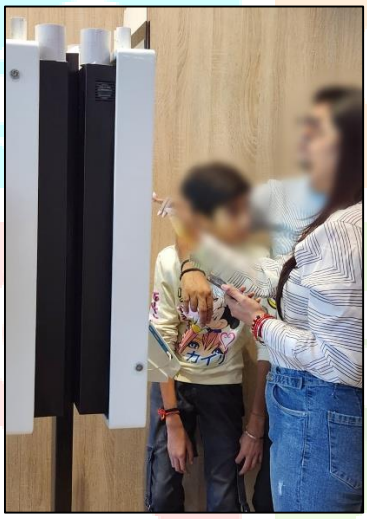
- **Anxiety Mitigation:** This sentiment was echoed by Participant 3 (couple, 25-28), who admitted to having "social anxiety" and noted that the kiosk "gives me power to look at the menu" without the pressure of a waiting server.

- **Finding:** For this demographic, the "efficiency" of the kiosk is defined not by speed, but by the autonomy it provides. The removal of the human element is seen as a feature, not a bug.

7.1.3.2. Interaction Complexity and "Family Friction"

While solo users experienced linear, efficient journeys, group interactions revealed significant design flaws.

- **Observation:** Participant 2 (family) demonstrated that the kiosk interface is ill-equipped for collaborative decision-making. The distraction of a child and the need to consult multiple family members led to over 20 touch errors and repeated backtracking, extending the order time to nearly 8 minutes.



- **Finding:** The linear navigation flow assumes a single, rational decision-maker. When applied to a chaotic group dynamic, the cognitive load increases, leading to errors and frustration.

7.1.3.3. The Digital Divide and the "Human Touch"

The study starkly captured the exclusion of older demographics.

- **Observation:** Participant 6 (couple, 50-55) represented the "digital immigrant" experience. Unlike the younger users who found the navigation "super easy," this participant found it "difficult" and required staff intervention.

- **Cultural Context:** His concluding remark, "Kuch cheezon mein Human Touch hi theek hai" (For some things, the human touch is better), underscores a profound cultural resistance. For this user, the automation represented a loss of service quality and assurance, leading to a rejection of the technology ("Cashier always").

7.2. Discussion

7.2.1. Theoretical Validation: The Dominance of "Ease" in Hedonic Contexts

This study contributes to the theoretical understanding of the Technology Acceptance Model within the context of the Indian hospitality sector. Traditional TAM studies often posit "Perceived Usefulness" as the primary driver of adoption. However, this research indicates a shift: in the high-velocity, low-stakes environment of QSRs, Perceived Ease of Use emerges as the superior predictor of intention.

The quantitative regression analysis supported this, showing that while usefulness matters, the frictionless nature of the interaction is what drives satisfaction. This implies that QSR kiosks are viewed as hedonic systems (driven by convenience and pleasure) rather than utilitarian systems (driven by productivity). Users do not approach a McDonald's kiosk to solve a complex problem; they approach it to get food quickly. Therefore, any barrier to "Ease", such as the interface complexity faced by Participant 2, results in an immediate drop in satisfaction, more so than a lack of features would.

7.2.2. Interaction Design: The "Single-User" Fallacy

From an Interaction Design perspective, the study highlights a critical gap in current kiosk interfaces: the "Single-User Fallacy." The observed friction in group ordering suggests that current designs violate the heuristic of Flexibility and Efficiency of Use.

The interface demands a linear progression (Select ➔ Customize ➔ Add). However, real-world family ordering is non-linear and iterative (Select ➔ Discuss ➔ Change Mind ➔ Remove). The rigidity of the current software forces users to "fight" the system to make simple changes, increasing the cognitive load. This supports the argument that future kiosk designs must incorporate "Social Ergonomics", interfaces designed to facilitate, rather than hinder, collaborative choices.

7.2.3. Sociological Implications: The Hierarchy of Digital Comfort

The research reveals a distinct sociological hierarchy in Delhi's QSR spaces:

- **The Autonomous Youth:** For Gen Z, the kiosk is an instrument of empowerment. The "Privacy Paradox" observed suggests that this generation prefers the predictability of code over the unpredictability of human interaction. The kiosk allows them to curate their consumption without judgement or social pressure.
- **The Excluded Elderly:** Conversely, for the older generation, the kiosk represents a "Service Void." The frustration expressed by Participant 6 illustrates that without intuitive "onboarding cues" (guided assistance), the technology is exclusionary. This finding aligns with the Digital Divide theory, suggesting that in developing economies like India, rapid automation in public spaces risks alienating a significant portion of the population who rely on traditional service models for assurance.

7.2.4. Managerial Implications for the Indian Market

For QSR operators in Delhi NCR, the findings suggest that a "total replacement" strategy (replacing all cashiers with kiosks) is premature.

- **Hybrid Service Models:** The distinct polarization between Participant 1 (who avoids cashiers) and Participant 6 (who needs them) dictates that restaurants must maintain a hybrid service model. The kiosk should be positioned as an "Express Lane" for digital natives, while the counter remains the "Service Lane" for families and older customers.
- **Interface Adaptability:** There is a clear need for Adaptive User Interfaces. Software that can detect a user's struggle (e.g., prolonged inactivity or repeated error clicks) and auto-trigger a "Help" prompt or simplify the layout could bridge the satisfaction gap for users like Participant 6.
- **Trust Mechanisms:** The reluctance of users to share contact details due to "privacy" concerns indicates a lack of institutional trust. QSRs must make data collection transparent and optional to avoid triggering resistance during the checkout phase.

VIII. Conclusion

8.1. Synthesis of Findings and Hypothesis Validation

This study utilized a mixed-methods approach to evaluate the interaction efficiency and user experience of Self-Ordering Kiosks in Delhi NCR. By triangulating survey data with in-depth observations, the research successfully addresses the proposed research questions and validates the theoretical framework.

8.1.1. Drivers of Kiosk Adoption (Addressing RQ1 & H1)

Research Question 1 asked how perceived usefulness and ease of use influence the intention to use kiosks.

The study concludes that while both factors are significant, Perceived Ease of Use (PEOU) is the primary determinant of adoption in the QSR

context. The qualitative data revealed that users prioritize a friction-free transaction over the functional utility of the machine. Younger users, in particular, utilize the kiosk to bypass social interaction, a behavior driven by the ease of the automated interface.

- Status of Hypothesis H1: Supported.

The regression analysis confirmed a positive correlation between Perceived Usefulness and Intention to Use. However, the study adds the theoretical nuance that "Usefulness" in this context is defined by speed and privacy rather than menu discovery.

8.1.2. Interaction Design and Satisfaction (Addressing RQ2 & H2)

Research Question 2 sought to identify specific interaction design factors affecting efficiency and satisfaction.

The study identified that linear navigation flows (simple selection) enhance efficiency, while non-linear tasks (group ordering, error correction, and customization) significantly degrade the user experience. Observational data highlighted that the lack of "social ergonomics" in the interface design leads to increased cognitive load and error rates for multi-person groups.

- Status of Hypothesis H2: Supported.

The data proves a direct, strong linear relationship between Perceived Ease of Use and User Satisfaction. When the interface imposes a high cognitive load, as observed with older participants, satisfaction scores drop precipitously, confirming that ease of interaction is the prerequisite for satisfaction.

8.1.3. The Impact of Demographics (Addressing RQ3)

Research Question 3 examined how user demographics impact comfort and success.

The research answers this by establishing the existence of a "Digital Divide" in Delhi's QSR sector. The findings reveal a stark hierarchy of comfort:

- **Digital Natives (Gen Z/Millennials):** Exhibit high comfort, use kiosks for autonomy/privacy, and report high satisfaction.
- **Digital Immigrants (Age 50+):** Exhibit low comfort, view kiosks as a barrier to service, and report significantly lower satisfaction.

Thus, demographic factors, specifically digital literacy and age, are critical predictors of whether a user will experience the kiosk as a convenience or a hurdle.

8.2. Limitations of the Study

While this research offers significant insights into the Indian QSR landscape, the following limitations should be considered when interpreting the results:

- **Sample Size:** The quantitative analysis relied on a sample of 115 respondents. While sufficient for exploratory analysis, a larger sample size would be required to statistically generalize these findings to the broader Indian population.
- **Geographical Constraint:** The study was confined to Delhi NCR. As a metropolitan hub with relatively high digital literacy, the findings may not accurately reflect user behavior in Tier-2 or Tier-3 cities where exposure to self-service technology is lower.
- **Observational Scope:** The qualitative observations were conducted primarily at major international QSR chains (McDonald's). The findings may differ in domestic restaurant chains where kiosk interfaces may be less standardized or intuitive.
- **Cross-Sectional Design:** The study captured user sentiment at a single point in time. It did not measure the "learning curve," leaving it unclear, whether older users might overcome their initial hesitation after repeated exposure.

8.3. Future Scope of Research

To further advance the field of Interaction Design in public spaces, future research should focus on the following areas:

- **Inclusive Design Interventions:** Future studies should experimentally test specific UI modifications (e.g., "Senior Mode," voice-assisted ordering, or simplified layouts) to measure their impact on closing the satisfaction gap for the 50+ demographic.
- **Payment Gateway Friction:** Since payment processing was identified as a qualitative pain point, future research should investigate how different payment modalities (UPI vs. Card vs. Cash) influence the final conversion rate and total transaction time.
- **Longitudinal Adoption Studies:** A longitudinal study tracking users over a 6-month period could reveal how "Perceived Ease of Use" evolves as users transition from novices to experienced users, providing data on the long-term viability of cashier-less models.
- **Collaborative Interfaces:** Given the friction observed in family groups, research into "Multi-User" interface designs, screens that accommodate two inputs or split-screen ordering—could offer solutions for the "Social Ergonomics" issues identified in this study.

Ultimately, the transition to self-ordering kiosks in Delhi NCR represents more than just a technological upgrade; it is a shift in the social fabric of dining. While the study confirms that digital natives embrace these systems to curate their experience and mitigate social anxiety, the resistance observed in older demographics serves as a critical reminder that efficiency should not come at the cost of inclusion. As one participant poignantly noted, for certain segments of society, the "human touch" remains irreplaceable. Therefore, the future of Quick Service Restaurants lies not in the total erasure of human service, but in a symbiotic design where technology supports the swift, while staff support the hesitant, ensuring that the digital transformation of Delhi's dining landscape leaves no customer behind

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