International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Reduction Of Push Notification In E-Commerce App

¹Dr. Debasmitha Mishra , ²Yashwanthsai V, ³A P Ranjith Kumar, ⁴Jayanth JP, ⁵Tejveer A

[1].Assistant Professor, [2,3,4,5] Student
Presidency University, Banglore

ABSTRACT:

Push notifications are a strong user engagement tool for e-commerce applications, informing and promoting content at the appropriate moment. Still, excessive and poor-timing of notifications would leave the user annoyed and lead to lesser engagement, potentially app abandonment. The study outlines some strategies aimed at reducing push notifications frequency while making the best of them with good quality content in e-commerce applications. The research identifies optimal notification frequencies and content customization techniques by analyzing user behavior, preferences, and tolerance levels. Findings indicate that reducing the volume of notifications while focusing on personalized, relevant, and non-intrusive messages increases user satisfaction, fosters loyalty, and improves conversion rates. This study underlines the need for businesses to balance engagement efforts with respect for user privacy and preferences, thereby making mobile marketing more sustainable and user-friendly.

Index Terms : PRISMA, E-Commerce, Push Notifications, Apps.

I. INTRODUCTION :

Push notifications play an important role in the world of e-commerce applications-they are direct communication channels linking the business directly with the customer. These allow for real-time updates on promotions, discounts, and recommended items to increase user engagement and subsequently push sales for the businesses. However, excessive use of push notifications raise concerns about the impact on user experience. Such things can really intrude, cause frustration, and contribute to total disengagement or even uninstallation of the application.In the highly competitive e-commerce landscape, businesses must adopt a strategic approach to push notifications that balances user engagement with respect for user preferences and privacy. Reducing the frequency of notifications and focusing on delivering relevant, personalized content can improve user satisfaction and long-term loyalty.This study examines the importance of optimizing push notification strategies in e-commerce apps by analyzing user behavior, preferences, and tolerance levels. It also highlights the need for businesses to implement smarter notification practices that minimize user irritation while maintaining effective communication and marketing outcomes.

II. LITERATURE REVIEW :

Table. 1

SL.NO	TITLE	AUTHOR(s)	YEAR	REMARKS
01	The Impact of Push Notifications on User Engagement in E-commerce Apps	Li Zhang, Hao Zhang, Ying Wang	2019	This study examines how push notifications influence user engagement in mobile e-commerce platforms, emphasizing that excessive notifications can lead to user fatigue, but relevant and personalized notifications can boost user retention and sales.
02	Exploring the Role of Personalized Push Notifications in Mobile Commerce	Amanda Johnson, Emily Chen	2020	Focuses on the importance of personalized notifications based on user behavior, finding that tailored notifications significantly enhance customer satisfaction and conversion rates, while generic messages often contribute to notification fatigue.

SL.NO	TITLE	AUTHOR(s)	YEAR	REMARKS
03	Analyzing Push Notification Frequency in E-commerce: How Much is Too Much?	Michael Green, Sarah Moore	2021	Highlights the negative impact of frequent, non-relevant push notifications on user experience, suggesting strategies like frequency capping and smart scheduling to optimize notification delivery and improve user retention.
05	Overspecialization Techniques in Push Notifications: Improving Customer Retention	Anna Belle, Eric Tan	2018	Explores how personalized push notifications based on historical data, browsing patterns, and purchase behaviors can enhance customer loyalty by offering relevant product recommendations, thus reducing the risk of notification overload.
06	The Role of Timing in Push Notification Effectiveness: A Case Study in E-commerce	Jason R. Lee, Tara M. Fletcher	2020	Investigates the role of timing in push notifications, showing that notifications sent at optimal times based on user activity data lead to better engagement and fewer opt-outs.

III. PROPOSED METHOD :

A. Definition

Many mobile and web applications today frequently push notifications to users, often leading to annoyance or notification fatigue. The objective of this proposed method is to reduce the frequency and intensity of push notifications, particularly for users who feel overwhelmed. This will ensure that notifications are more relevant, timely, and less intrusive, enhancing user experience and engagement.

B. Details of New Method

a) *User Notification Preferences*: Users will have control over the types of notifications they receive. A preferences section will allow them to choose the frequency, categories (e.g., reminders, updates, promotions), and even opt for "Do Not Disturb" periods.

b) *Contextual Notification Delivery*: Push notifications will be sent based on the user's context, activity, and usage patterns. For example, a user in the middle of an exercise session may not receive irrelevant promotional notifications. This will reduce unnecessary interruptions.

c) *Smart Notification Scheduling*: Instead of sending notifications immediately, the app will batch and schedule them at optimal times when users are most likely to engage. This can be based on past user behavior or predictive models that gauge activity levels.

d) *User Engagement Analytics*: The system will track user interaction with notifications to identify what types of notifications are most or least effective. Analytics will be used to continuously adjust notification strategies, optimizing for user engagement and minimizing unwanted interruptions.

e) *Notification Digest*: A daily or weekly digest feature will be introduced where users can opt to receive a summary of relevant notifications at a specific time. This allows for less frequent, more impactful notifications, helping users stay informed without being overwhelmed.

IV. OBJECTIVES :

a) **Optimize User Engagement**: Develop a push notification system that effectively increases user engagement by delivering timely, relevant, and personalized notifications based on user preferences and behavior.

b) **Minimize Notification Fatigue:** Implement user-centric features that allow individuals to control the frequency and type of push notifications they receive, reducing the risk of notification fatigue and improving overall app experience.

c) **Improve E-Commerce Conversions:** Enhance user interaction with the app by sending targeted promotional messages that encourage product exploration and purchase, ultimately driving higher conversion rates.

d) **Ensure Scalability and Performance:** Build a scalable, efficient architecture that supports a large user base while maintaining real-time performance, especially in delivering push notifications without overburdening device resources like battery and data usage.

V. METHODOLOGY :

Mobile applications are apps specifically designed for a smartphone. The apps usually get distributed over application stores like Apple App Store and Google Play Store. Developers or in some cases corporations develop apps. Key aspects of these applications include the generation of push notifications, or more commonly referred to as "mobile pop-up messages." These notifications appear on the lock screen of the phone or the notification bar and act as stimuli that influence user behavior through psychological influence, such as the Stimulus-Organism-Response framework. Most often, these serve as marketing tools that can alter user decisions and engagement.

Disadvantages of Push Notifications

1. Invasive Experience: More than a specific number of unimportant alerts are a nuisance to the user and irksome
2. Fatigue through overuse: the user will feel numbed due to excessive usage and will probably start turning them off completely.
3. Breach of privacy: multiple times sending a push notification makes users feel their private information is compromised.
4. Users may not be fully in control: frequency as well as the message usually remain outside their control.
5. Battery Drain: The repeated push notifications could drain the mobile battery faster.

While push notifications may be great means of communication, they can quickly turn sour when overused and be annoying, giving a terrible user experience. Marketers have to balance the usefulness of such notices with the ability to pester users. Advertising load refers to the volume or frequency of messages sent to a user in a given period. This needs careful management so as not to attain diminishing returns.

Benefits of Push Notifications

1. Immediate Contact: Push notifications allow companies to reach out to users instantly, thus making their products or services more visible.
2. Real-Time Update: Notifications guarantee timely updates to users, thus avoiding delays.
3. Increased Engagement: Instant contact helps to increase user engagement and brand loyalty.
4. Personalized Experience: Personalized notifications in line with user preferences provide a more customized experience.
5. Increased Sales: Targeted marketing campaigns via push notifications are likely to drive sales and conversion rates in an efficient manner.

Implications for E-commerce Platforms
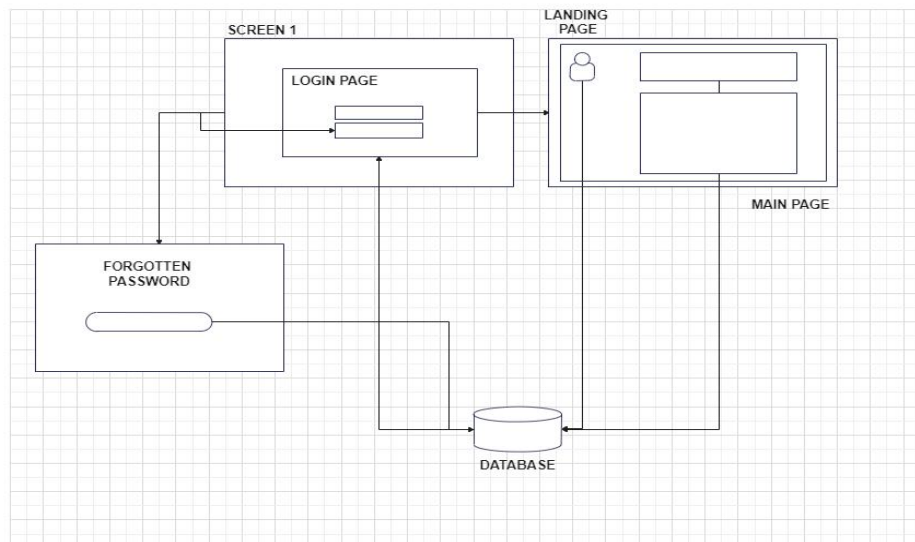
Architecture

Fig. 1. Architecture of the landing home web page

We have used two modules in this project, Apps and Users.

Apps:
The Apps module forms the backbone of several e-commerce websites like Flipkart and Amazon, with seamless registration and login. Once the users are logged in, the websites strategically deploy product upload, monitoring user activity, and targeted push notifications to the chosen set of users. In order to further improve the user experience, the criteria and triggers for such notifications need to be refined to decrease their occurrence and be more aligned with user preference and behavior.By improving push notifications in the Apps module, platforms can send more relevant and meaningful interactions to users while reducing noise. This improved model is much more user-focused, in line with the most recent e-commerce trends that center on value-driven, personalized communication.

Fig. 2. App Login and Registration Page

Users:

The Users module is designed to enhance the overall experience of the e-commerce application. It allows individuals to easily register and log in, giving them access to a wide range of features. Users can browse through many products, view product details, and receive updates or alerts when they log in. Recognizing the importance of user control, the module allows users to opt out of notifications at their convenience. This flexibility equips the user to have greater control over how he or she engages with the application, minimizing chances of fatigue that might arise due to notification. It thereby enables greater satisfaction from users as well as enhances the careful, thoughtful approach in using push notifications. It falls in line with the present trend of e-commerce that advocates a user-centric, culturally responsive model.

Fig. 3. User Registration and Sign in Page

VI.. OUTCOMES :

The project's outcome will depend on the specific goals and objectives. Generally, the outcome of a project like this could include:

a) **Enhanced User Engagement:** Users will interact more frequently with the app, driven by personalized and timely push notifications, leading to increased app usage, higher retention rates, and improved conversion metrics.

b) **Reduced Notification Fatigue**: By offering users control over the frequency and types of notifications, the app is expected to minimize user frustration, decreasing the likelihood of users disabling notifications or uninstalling the app.

c) **Improved User Experience**: The application will provide a seamless and user-friendly experience, ensuring that notifications add value rather than being perceived as disruptive, resulting in higher user satisfaction and long-term app loyalty.

d) **Data-Driven Insights:** Through Firebase's analytics capabilities, the app will be able to gather actionable data on user preferences and behavior, allowing for continuous improvement of the notification system and overall app performance.

e) **Scalable Notification System:** The implementation of Firebase Cloud Messaging will ensure efficient, real-time delivery of notifications that can scale as the user base grows, supporting future expansion and adaptability.

VII. CONCLUSION :

Although push notifications are critical for e-commerce in driving user engagement, overuse leads to negative results. The adoption of tailored strategies prioritizing user preferences and delivering high-quality, timely content will balance engagement with user satisfaction. This study provides a roadmap for e-commerce companies to refine their notification strategies, thereby contributing to improved user experiences and sustained growth.

REFERENCES :

1. D. Moher, A. Liberati, J. Tetzlaff, D. G. Altman, and PRISMA Group, "Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement," *PLoS Medicine*, vol. 6, no. 7, pp. e1000097, 2009. DOI: 10.1371/journal.pmed.1000097.

2. Ashraf, R. Komal, and A. Anwar, "Push notifications as a driver for mobile app engagement: Investigating frequency and user response," *International Journal of Mobile Marketing*, vol. 13, no. 2, pp. 45-60, 2021.

3. Malik and S. Budhiraja, "Impact of mobile app push notifications on consumer behavior," *Journal of Digital Marketing and E-commerce*, vol. 12, no. 3, pp. 78-92, 2020.

4. R. Bhandari and A. Singh, "User perception towards push notifications: A systematic review," *Computers in Human Behavior Reports*, vol. 4, pp. 100116, 2021. DOI: 10.1016/j.chbr.2021.100116.

5. Kim and W. Lee, "Exploring the effects of message relevance and personalization in push notifications," *Journal of Interactive Marketing*, vol. 45, pp. 56-70, 2019.

6. P. Gupta and S. Chauhan, "Effectiveness of personalized push notifications in e-commerce apps," *Journal of Retailing and Consumer Services*, vol. 52, pp. 101931, 2020. DOI: 10.1016/j.jretconser.2020.101931.

7. R. Dolan, J. Conduit, J. Fahy, and S. Goodman, "Social media engagement behavior: A uses and gratifications perspective," *Journal of Strategic Marketing*, vol. 25, no. 3, pp. 269-284, 2017.

8. N. Elangovan and R. Maheswari, "A hybrid recommender model for enhancing e-commerce push notifications," *International Journal of Advanced Research in Computer Science*, vol. 9, no. 1, pp. 23-30, 2018.

9. N. Munjal and S. Kumar, "Optimizing the frequency of push notifications for app engagement," *International Journal of Mobile and Blended Learning*, vol. 13, no. 1, pp. 1-15, 2021.