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Research Proposal

Developing a mobile engagement app: Evaluating push notification strategies for improved customer engagement

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1. Introduction

1.1. Research title:

Developing a mobile engagement app: Evaluating push notification strategies for improved customer engagement.

1.2. Background:

In the retail sector, mobile applications have become important tools to allow businesses to improve the engagement between themselves and their customers by allowing for faster and more customizable communication. As the retail landscape becomes more competitive, retail and subscription-based businesses have increasingly relied on custom-built mobile applications with notifications to inform customers of promotions and keep their attention. These notifications can be used to drive up the user engagement with the retail store. A key feature which is used in nearly all retail apps is the push notification which allows the businesses to inform its customers of sales and new items available for purchases among others. Notification frequency has been observed to affect the behaviours of users and utilizing the optimal frequency improves the time users spend on these apps as well as how often they end up buying. However, too many notifications have an adverse effect (Wohllebe *et al.*, 2021).

Custom-built mobile applications provide customers with an easier way to see what is happening with their favourite stores. They have a strong impact on the satisfaction and loyalty of the business' customer base and when it is built to prioritize human characteristics this effect is heightened. If the needs and expectations of the users are not met, however, there will be a negative impact (Gavilan and Martinez-Navarro, 2022).

Research into notifications with regards to their timing and its impact on user response has indicated that providing the notification under the correct context improves the interaction speed of its users. For example, Stach et al. (2024) analysed 10 million mobile notification and concluded that message timing, along with user context, has a strong determination on the response timing of users.

Despite the research that has already been done, there has been little research into the effects push notification and mobile apps have on retail- and subscription-based applications. For this reason, it is important to focus on how these notifications can be utilized to improve the communication between businesses and their customers.

It is important to address this as it will provide smaller businesses, which are a cornerstone to many local communities, to keep up with the rise of online retail stores and create more traffic into their own physical store. Creating an app using the gathered data on notifications and communications, can help businesses, in particular smaller businesses, more effectively communicate and connect with their customers.

1.3. Problem statement:

Subscription-based businesses often struggle with lower-than desired levels of customer interaction when relying on traditional communication channels such as email. Agachi et al. (2023) found that periodic email prompts did not significantly improve app usage. These outdated methods are not designed to engage customers in real time, resulting in low open rates and a decline in customer engagement. As a result, businesses face challenges in maintaining customer relationships, retaining subscribers, and effectively promoting new offers.

In this digital age, customers expect timely and personalized communication. Bell et al. (2023) observed that push notifications can increase app engagement by up to 3.5 times. However, smaller businesses either lack access to customizable solutions or do not fully understand how to implement push notification strategies effectively.

Furthermore, limited research exists on how different push notification strategies influence customer behaviour within mobile apps, especially in retail and subscription-based contexts. This research project aims to address this gap by developing a mobile app capable of implementing customizable push notification strategies. This app will be used for implementing the researched push notification strategies.

1.4. Research questions:

1. How do push notifications compare to email communication in terms of customers' cognitive load and informational needs?
2. How do digital engagement touchpoints, such as push notifications, affect customer loyalty and satisfaction?
3. What is the effect of push notification frequency and timing on customer engagement and app usage?
4. What push notification types are most effective in increasing customer engagement?
5. How can a mobile app be developed to support customizable push notification strategies?
6. How can customer preferences for different types of push notifications be integrated into a customizable notification system?

These research questions are formulated to explore both the customer experience and technical implementation of a mobile app push notification system. They investigate how different push notification strategies affect customer engagement and guide development of a mobile app that can deliver these notifications in an effective way.

1.5. Research objectives:

1. Compare the effectiveness of push notifications and email communication in terms of cognitive load and meeting customers' informational needs.
2. Investigate how digital engagement touchpoints, such as push notifications, affect customer loyalty and satisfaction.

3. Assess the impact of push notification frequency and timing on customer engagement and app usage.
4. Examine the effectiveness of different push notification types.
5. Identify potential drawbacks of push notifications, such as customer annoyance or increased app uninstall rates.
6. Develop a mobile app prototype that allows for customizable push notification strategies.
7. Integrate customer preferences for different notification types, such as promotional and reminder-based, into the app's notification system.
8. Provide recommendations for effective mobile app push notification strategies that can increase customer engagement, app retention and improve customer experience.

These objectives are closely connected to the research questions and will guide both customer evaluation and technical implementation of the research. They ensure that the research delivers measurable outcomes in terms of customer engagement and push notification strategies implementation.

1.6. Justification for the study:

As the retail sector becomes more reliant on digitization, larger retail companies and outlets have been able to harness this potential to their advantage by connecting with their customers. Smaller businesses, however, have more limitations which prevent them from utilizing this recent technology in the way bigger businesses are able to. This creates a gap in the abilities of small and large retail businesses to connect and communicate with their customers. For this reason, it is important to explore the potential of applications which can allow these businesses to catch up and improve their connections with their customers and local communities.

This study is justified by the gaps in research with regards to this specific topic. While there have been copious amounts of previous research into notifications and their effect on engagement within other, more generalized applications, little to no research has been done on the utilization of mobile apps with notifications, particularly for smaller retail businesses. There is also a lack of prototype usage to conduct such studies.

Studies also lack a direct comparison between mobile push notifications and more traditional means of communication with customers, like email, particularly on its effects in customer engagement, conversion rates and customer satisfaction. With the attention of individuals becoming more difficult to capture it is increasingly important to understand how businesses can best capture and hold users' attention in a way that is effective and does not overwhelm them.

This research project aims to uncover what notification techniques may best assist small retail and subscription-based businesses with holding communications with customers. This gathered information will then be used to develop an app, usable by small businesses, which facilitates the communication between the retailer and their customers through effective notification techniques.

1.7. Research project timeline:

Phase	Month					
	June	July	August	September	October	November
Research planning and approval						
Literature review and strategy research						
Data collection and analysis						
Requirements gathering and system design						
App development						
Testing and refinement						
App evaluation						
Final conclusion and reporting						
Submission and presentaion						

Figure 1.1 – Gantt chart of research project timeline

2. Literature review

Push notifications are a part of almost every mobile application these days and receiving one is almost unavoidable (Özdemir, Mottus and Lamas, 2025). According to Pham et al. (2016), push notifications increase user engagement, however it can have the opposite effect if the push notifications are too frequent, being seen as intrusive, unwelcome and annoying (Gavilan and Martinez-Navarro, 2022).

According to Wohllebe, Adler and Podruzsik (2021) the design elements of the push notification, e.g., title, can positively affect how users interact with the notification and thus the application itself. By using different user-driven notification reception modes that configure the system that allow users to how and when they receive notifications from the app (Kim and Park, 2025). Based on the findings of Wohllebe et al. (2021), indirect app opens from notifications are not affected by the frequency of push notifications, however, uninstall rates do increase with the frequency of notifications. This demonstrates that users respond negatively to frequent, ill-timed push notifications (Nguyen Tran *et al.*, 2025). Nanta et al. (2025) shows that any form of digital touchpoint usage positively affects user engagement and satisfaction, which provides insight into positive ways to increase user engagement.

Context- and timing-based notifications are a strategy that increases user engagement as it uses time and context to determine when notifications are sent and when not to send them, for example a news app is most frequently used early in the mornings, ergo, notifications should be pushed in the morning (Tian, Zhou and Pelleg, 2022). Another strategy would be notification gamification, as using progression incentives (e.g. points, scores, progression) increases user engagement (Kunkel, Hayduk III and Lock, 2023). These incentives improve the user's mood and motivate the user to interact with the notifications. The user should, regardless of what strategy is employed, should have control over the frequency of notifications they receive (Wheatley and Ferrer-Conill, 2021).

By using a pragmatist paradigm in this study, the research can focus on the practical results and real-world application to determine whether the findings of this research are a solution to reduced customer engagement on mobile apps. There is a gap in the research for push notifications, and it may prove difficult to find credible research

papers on this research topic (Wheatley and Ferrer-Conill, 2021). This research will lead to the development of a mobile application that would pose as a plausible solution to problems discussed in this research. The mobile application will be developed on Flutter as it provides strong UI customisation and rapid development cycles and provides the most effective performances overall (Jošt and Taneski, 2025). A cross-framework platform would be most beneficial to this research due to time constraints and ability to reuse code across both Android and iOS.

This research will investigate the effects of mobile app push notifications on customer engagement and what designs and methods can be used to make the notifications more effective (Gavilan and Martinez-Navarro, 2022).

3. Research methodology

3.1. Research paradigm:

This research makes use of a pragmatic paradigm as it focuses on practical outcomes and real-world applications of the research to observe effective solutions to the problems presented (Elgeddawy and Abouraia, 2024).

Pragmatism is a fitting paradigm for approaching and solving practical problems, for instance the research objective of assessing the impact of push notification frequency and timing on customer engagement.

Pragmatism supports a flexible approach to research that supports both quantitative and qualitative methods to ensure the research problem is addressed as effectively as possible. The research aims to design, evaluate, and implement different push notifications.

Pragmatism aligns with the research objectives in terms of:

- Assessing which strategies are most effective based on collected data from users.
- Developing a mobile app to implement different notifications strategies.

Pragmatism and its flexibility in terms of research allows the researchers to explore both quantitative and qualitative methods. It helps explore the qualitative question “why it works” based on user feedback and the quantitative question “what works” based on data collected on different notification strategies. This allows us to draw conclusions from information based on collected data to ensure accurate research findings.

3.2. Research method:

This research is based on a pragmatic research design, which emphasizes using the most effective methods – quantitative, qualitative, or both – to answer the research questions. Pragmatism is not bound to a single philosophical stance or methodological tradition. Instead, it focuses on practical outcomes and real-world problem solving, making it well-suited to exploring digital engagement and user

experience in dynamic environments. This approach aligns directly with the research questions which involve both measurable data and user perceptions.

Pragmatism allows for flexibility in methodology, which combines qualitative and quantitative data. It promotes a practical, problem-solving focus which proves to be ideal for studying user behaviours and ways of communicating in digital settings. The use of a pragmatic research design allows the researchers to adapt tools and data collection methods to suit the needs of each research question.

A few limitations of this design would be that there is a potential for bias when interpreting qualitative responses, and it is time and resource intensive seeing that it involves collecting and analysing different types of data.

3.3. Data collection methods:

The main data collection methods that will used in the research is:

- Online surveys.
- Focus groups.

Online surveys

Online surveys will be randomly disturbed to individuals, as well as subscribers of the current email system. There will also be a request for users to complete a survey if they use the mobile application.

The survey will mostly include closed-ended questions to get more measurable and comparable answers from users regarding the user experience while using the mobile application.

The survey will also have some open-ended questions that will give more insight into the user personal experience and preferences regarding push notifications.

Surveys are effective in gathering standardized feedback from a large group of users, this will help improve the understanding of what the most effective push notification strategies is.

Focus groups

Focus Groups help gather qualitative data on how users will interact with push notification and gather their thoughts and opinions on different types of notifications and strategies.

Participants will be shown an application with different notification strategies, designs and features. User feedback will be received by a guided conversation allowing participants to share their experiences, thoughts and perspectives regarding the different types of notifications.

Focus Groups allow for a more personal experience with the user and can give more insight into user behaviour surrounding the application and notifications. The

feedback received from users during the focus groups will help in improving the application and notification strategies.

Caution needs to be taken into consideration when collecting data for the proposed research to avoid biases and ensure reliability.

Avoiding biases and ensuring reliability

Sampling bias

A variety of different users will be surveyed from different demographics and age groups, as well as randomly selected users to ensure a variety of different users.

Consistent surveys

All surveys will have the same questions for all users and will be hosted on the same platform. The questions will be clear to avoid confusion and ensure that the received data is reliable.

Piloting tools

An initial pilot test can be done on a smaller scale to ensure that there is no confusion regarding any of the questions and to ensure that the data collected is not bias. This will ensure that any issues or confusion regarding the surveys will be improved once the full-scale research is launched.

Privacy and anonymity

All data gathered from surveys will have no connection to the user's identity and will be collected anonymously. The same will be applied for the focus groups.

Reliability of data collection

To ensure the reliability of data collected through surveys and focus groups, consistent procedures will be followed across all participants. Focus groups will be facilitated using a standardized guide to reduce interviewer bias and maintain uniformity in data collection.

3.4. Data analysis methods:

To analyse the data that was collected through online surveys and focus groups based on different push notifications strategies, this study will employ the following techniques to analyse the data:

Joint displays will be used to integrate and align quantitative and qualitative data visually by charting session durations, themes of cognitive load or satisfaction as well as click-through rates. These comparisons will allow the researchers to find patterns like contradiction, or expansion across types of data (Guetterman, Fàbregues and Sakakibara, 2021).

Another technique that may be used in the study would be the sorting of qualitative data into categories. This involves organising qualitative responses into predefined categories based on shared meanings. This method will help to structure open - ended feedback, which makes it easier to identify trends and compare responses within and across categories. This technique also makes it easier for researchers to transform the categorised data and quantify it (Neale, 2016).

Data transformation will also be used to quantify qualitative data so that the quantified responses may be analysed and compared with other responses numerically. This method was deemed appropriate by the researchers due to the fact that qualitative data may be difficult to be interpreted without supervision from experts. Quantifying the data makes it easier to interpret, and the resulting statistics can be more readily integrated into the overall analysis (Nzabonimpa, 2018).

Joint displays, allows for a clear visual comparison between qualitative and quantitative findings. This makes it easier to identify any inconsistencies or links.

Categorising qualitative data helps researchers interpret qualitative data more efficiently. This allows researchers to compare feedback and prepare it for data transformation.

Data transformation closes the gap between structured and unstructured feedback, making integration easier for the researchers.

Limitations that the researchers have taken into consideration regarding these techniques:

- Joint displays may become more complex as the datasets increase.
- Categorising quantitative data is reliant on subjective judgement which introduces the risk of bias from the researchers.
- Data transformation may oversimplify responses and lose out on the context converting the subjective responses into statistical data.

3.5. Handling incomplete or inconsistent data:

To combat incomplete data sets the survey will have to have all fields completed for it to be submitted, the survey will also have input validation to ensure that the entered data is in the correct format preventing invalid inputs.

The survey results will also be checked for duplicate entries where it then can be merged or one of the entries removed. It will also check for outliers in the dataset that will then be flagged for review to ensure consistent data.

Uncompleted data sets or invalid data that has passed through input validation and mandatory fields will be marked for reviewed and removed if data is deemed to not be useful or not complete enough.

All data sets received from these surveys will be stored and will be able to be reviewed to ensure correct data is used and complete data is saved.

A recording and transcription process will be used to preserve data accuracy of the focus groups. Notes will be taken during each session and multiple team members will be present for interpreting of the finding; this will minimize personal bias. Where responses are unclear or contradict earlier statements will be noted and clarified where possible during sessions, otherwise it will be flagged for further analysis.

4. Ethical consideration

The research will follow three main ethical principles those being confidentiality, voluntary participation and informed consent. Before taking part in the research study, all voluntary participants will receive an explanation about the research purpose as well as what the participants role will entail towards the research. This will all be formalized through a consent form which will be mandatory for all voluntary participants to sign to confirm the participants understand and agree. Should any participant wish to leave the research study the participant is free to do so and any collected data up until that point will be deleted upon request. Should there be any discomfort caused by the push notifications on the developed mobile app towards the participants, the mobile application will include settings for participants to opt out of notifications.

One potential risk in this research study involves error in handling user data. To address this, any collected data will be kept in a password protected Excel spreadsheet on Eduvos' server that will only be accessible to members of the research team. The code-key file that links codes to the participants' identities will be kept separately on an encrypted drive enabled with Two factor authentication.

To ensure the research study remains ethical, all data will be collected and analysed using consistent methods that align with the research plan. Data and participant feedback will be collected without any influence or manipulation from the research team, ensuring unbiased results. Participants will interact with the same version of the mobile application prototype under similar conditions, which will help support fairness and consistency across the research study. All results collected will be documented and reported regardless of whether the results support the expected outcome of the research study or not. The research team will keep detailed documentation of all decisions made throughout the research study allowing for transparency. To further strengthen the integrity and reliability of the research study regular feedback will be given by the research team's supervisor ensuring that ethical standards are being met from start to finish.

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