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Research Article

Location-Based Marketing Using Mobile Geofencing: Lessons Learned from a User-Centered Application Development Research

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Abstract:

Location-based marketing (LBM) is becoming an integral element of the media mix for making highly personalized offers to the targeted audience at the most opportune time and place. Yet, the literature calls for more usability studies due to the lack of user-centered research. To fill this gap, this study explores the development of PushMapp – a geomarketing tool for launching LBM campaigns – through a user-centered, parallel-iterative approach. Usability analysis shows that this type of application is affected by issues related to security, privacy, advertisement relevancy, and notification overload. Meanwhile, only performance expectancy, effort expectancy, and hedonic motivation appeared to be the significant factors in an LBM mobile application. Experiences from this study provided valuable insights for marketers and business owners who plan to capitalize on LBM strategies by underscoring the importance of integrating users' input, ensuring usability compliance, and conforming to factors of mobile application utilization.

Keywords:

Location-Based Marketing, Geofencing, Marketing, Advertising, Usability, Mobile Application Development

INTRODUCTION

The collision of mobile technology with brick-and-mortar stores transformed the mobile channel into the fastest-growing retail touchpoint for businesses and consumers (Khimji & Jenny, 2009; Varnali & Toker, 2010). Considering how ingrained mobile devices are in consumers' lives (Mushroor et al., 2020), there is an opportunity for businesses to capitalize on the public's appetite for mobile content (e.g., made-for-mobile media). As history has shown, marketing and advertising follow whenever a concentration of consumers and media is present. It has been long predicted by Barnes and Scornavacca (2004) that mobile devices will become a mainstream channel for advertising where advertisers could deliver brand engagement and build meaningful relationships (Krairit et al., 2012). A decade later, Öztaş (2015) underscores the growing importance of mobile marketing through the proliferation of mobile phone usage. Notwithstanding, a comprehensive literature review (Varnali & Toker, 2010), consisting of 255 articles from 82 different journals, concluded that there is a lack of common understanding of mobile marketing term-wise due to the absence of a commonly accepted classification framework. Nevertheless, it has not stopped researchers from eliminating marketing nuances by establishing universal knowledge and theories about the behavior of and adoption by consumers (Donga et al., 2018; Mittal & Kumar, 2020; Murillo-Zegarra et al., 2020; Pacheco-Bernal et al., 2020).

As digital marketing becomes more prevalent, several studies evaluated mobile platforms as a marketing and advertising medium. Kavassalis et al. (2003) reported increased effectiveness in mobile marketing over traditional media, where the response rate of text messaging campaigns is in the range of 10-20% as opposed to print advertising (0.15 - 0.60%), email (5%), and direct mail (1 - 2%). Meanwhile, Somayeh et al. (2012) evaluated mobile advertisements via text messages to assess the association of participants' interest in a public donation. By using mobile marketing campaigns, the study revealed that text message advertising is an effective strategy to increase people's willingness to donate to cancer patients. The success of such a marketing strategy was promulgated by factors related to message (e.g., control, content, personalization), media (e.g., transmission process), and perceived success (e.g., social norm, credibility). Another example is the evaluation of how mobile marketing, from a social media perspective, influences customers' experiences related to purchasing. Khalufi et al. (2019) concluded that people make purchase decisions when there are advertisements on their mobile phones. Although large-scale studies are still warranted for more extensive and generalizable results, the literature supports mobile as an effective medium for businesses and advertisers (Ström et al., 2014). This positive usage is further illustrated in the mobile application *"Mobile Bookkeeper"* (Garcia & Claour, 2021).

Just like traditional marketing, however, mobile marketing is likewise subjected to challenges. One major issue for marketers is the ability to make highly personalized offers to the targeted audience at the most opportune time and place (Mittal & Kumar, 2020). In marketing, *personalization* is defined as a process of consumer identification through its preferences, behavior, purchase history, and other personal information to provide the most appropriate advertisements. This is different from *customization* where consumers have the power to select

the advertising type that they prefer. In essence, personalization is done for the consumers while customization is initiated by the consumers. Suleyman et al. (2017) asserted that marketers and entrepreneurs should shift their attention from mass to personalized mobile marketing strategies. Aside from demographics and purchase history, location is another piece of information to help in personalization which precipitated the ongoing research on various location-based services (Huang et al., 2018), marketing (Palos-Sanchez et al., 2018), and advertising (Bauer & Strauss, 2016). Despite many existing studies on mobile marketing, more research is warranted, particularly on location-based marketing (LBM) in finding solutions to its common issues (Jaradat et al., 2015). More importantly, the literature review of Bauer and Strauss (2016) highlighted that only two publications (out of 32) gathered user perspectives and asserted that more user-centric research is needed in this area.

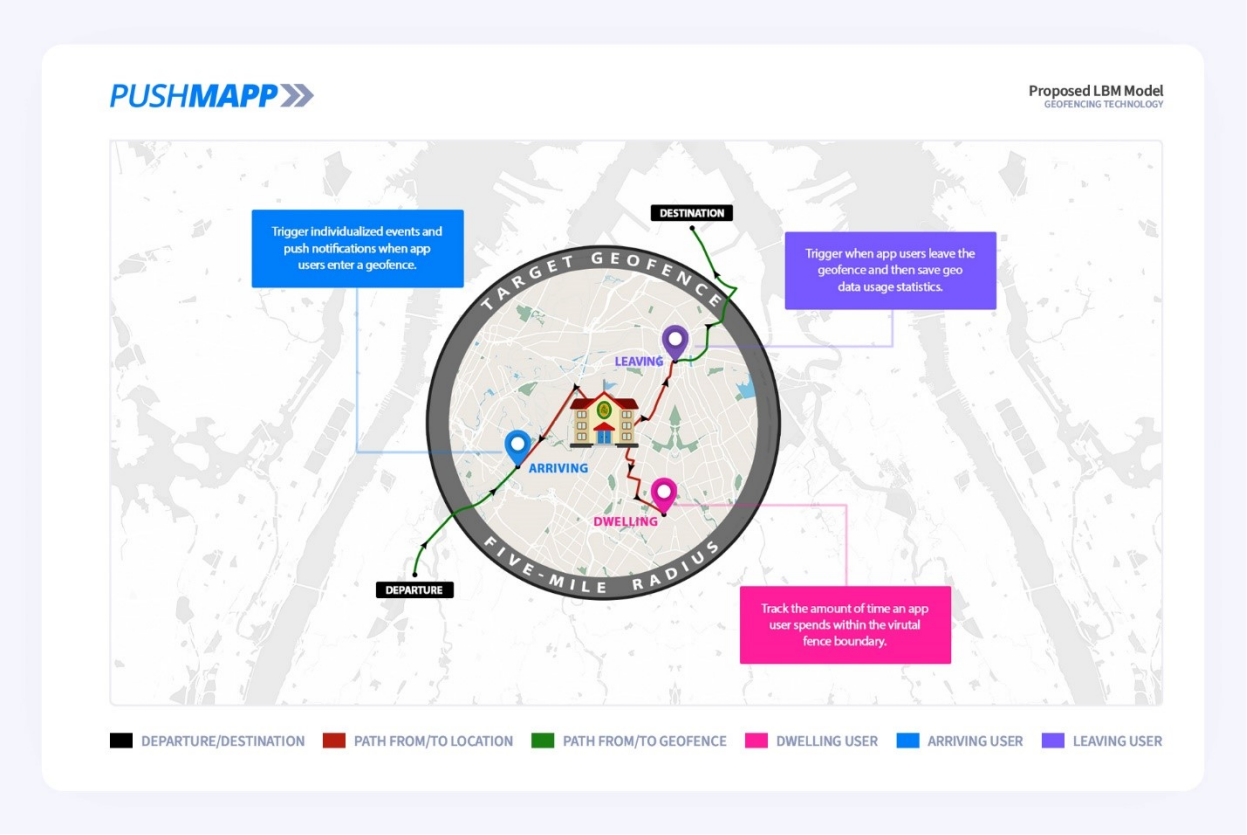

Figure 1. Proposed LBM model using mobile geofencing and real-time geographical data.

To fill these gaps and contribute to the existing thread of discussion and evidence on LBM, the present paper explores the development of a geomarketing mobile application called *PushMapp*. This mobile application is envisioned for launching LBM campaigns through the employment of real-time geographical data and geofencing technology (Figure 1). Aside from the mobile application development, a usability study was included. Albeit the concepts of targeted advertisements and LBM are not new, this is the first usability study of a geomarketing mobile application. Both development and evaluation components of the present study follow a user-

centered approach to better understand how users perceive such a mobile application. Garcia (2020) implemented a user-centered approach to a complex mobile application and realized the importance of including users in the project development. More importantly, the user-centered approach is an attempt to explore the common challenges of implementing LBM, such as targeted push notification advertisements, privacy concerns, relevancy of ads, intent to opt-in, and location accuracy. Experiences from this mobile application development will provide significant theoretical insights (e.g., consumer sentiments and experiences, advertising campaign analysis, and application design) to marketers, entrepreneurs, and business owners who plan to capitalize on LBM strategies. In the succeeding chapters, a literature review on LBM and other related marketing technologies is explored then followed by the research methods employed, results of the experimentation, discussion of the findings for both usability and utilization, and limitations, conclusions, and implications.

BACKGROUND OF THE STUDY

LBM and Location-Based Advertising

In the modern business world, LBM is one of the emerging technology-enabled strategies that radically changed the way businesses and advertisers see mobile users and consumers (Bauer & Strauss, 2016). At its core, LBM is employed as a direct marketing strategy to deliver relevant messages to the right users at the right time and place (e.g., sending discounts or coupon alerts for anyone who enters a virtual fence). By leveraging the user's mobile device's geographic location, this marketing technique can, for instance, select the most appropriate advertisements or promotional messages (Peterson & Groot, 2009). These personalized services are achievable through the location data provided by a native module (e.g., GPS/A-GPS) that can access the mobile device information. More specifically, such location data can be obtained by accessing the server-side application connected with the carrier's location platform or by using a location Application Programming Interface (API) such as Location and Context APIs (e.g., Places, Geofencing, Fused Location Provider, etc.) by Google, Geolocation API by Mozilla, Location Context Platform by Radar, Location Suite by Here, and a lot more.

Presently, there is no clear distinction between LBM and location-based advertising (LBA). Both concepts are used interchangeably in the literature on location-based services. Borrowing from the traditional business concepts, marketing is associated with product promotion and market research while advertising is a subset of marketing that is typically part of a marketing plan. Conversely, both LBM and LBA use location as the primary data to regulate the distribution of advertising strategies (Bauer & Strauss, 2016; Palos-Sanchez et al., 2018). Location data, when combined with other important information (e.g., the exact time when a customer entered an outlet and what feedback was made during the visit), establishes the mobile user context. Consequently, it generates detailed information about offline consumers in such a way that online businesses can efficiently analyze their digital consumers. Ketelaar et al. (2017) examined the effects of location congruency on consumers' attention to advertisements and found

that it increases perceived personal relevance of the message and attention to the advertised brand. Van 't Riet et al. (2016) added that it would only result in more purchases when an advertisement is high in terms of goal relevance. Meanwhile, other factors such as privacy, advertisement format, and brand credibility affect the attitude of consumers towards LBA (Chen et al., 2014). When developing a mobile application for executing LBM or LBA strategies, these issues must be considered throughout the project lifecycle as development parameters.

Geographical Information System for Marketing

The capability of the Global Positioning System (GPS) to determine the ground position of an object has never been more important for the business world. More and more geographic data is created and collected as the number of GPS-enabled mobile devices increased in the last decade (Yang, 2015). As a result, various market opportunities are constantly appearing, such as location-based push notifications (Wohllebe, 2020), market segmentation (Kiema et al., 2007), personalized product recommendations (Chougule et al., 2019), geographically targeted digital advertisements (Lai et al., 2017), and more. To capitalize on these opportunities, marketers are integrating their own Geographic Information Systems (GIS) in their decision-making process. Turk et al. (2014) claimed that GIS could play a significant role in marketing planning, and lead to new marketing strategies. This argument stemmed from the competitive advantage of leveraging intelligence data and knowledge of market factors, which are maximized by GIS to improve marketing decisions. Ismael and Bashir (2014) tested this idea and developed their GIS and geospatial database designed to make business judgments not only according to attributes of business entities but also on their spatial properties (e.g., location, proximities, zones of influence, overlaps, scale, and distance) as well. Based on their analysis, a GIS can lead to better-informed decisions.

As we transition to a mobile era, marketers likewise shift to mobile GIS. For most cases, mobile GIS is micro-level cloning of desktop GIS (often referred to as Web GIS) with components such as a mobile device (e.g., personal digital assistant, smartphone, tablet, and wearable device), applications, data layers, spatial data, geo-computing ability, and visualization style (Gao & Mai, 2018). Cliquet and Baray (2020) attributed the growth of mobile spatial marketing to the arrival of smartphones. To understand the idea behind geolocation, four concepts were mentioned such as omnichannel, spatial databases, proximity, and mobility and geolocation. First, the omnichannel is considered as a consumer activity describing shopping trips through different marketing channel points of sale (e.g., "*phygital*" or the combination of physical and digital space). Spatial databases, on the other hand, are associated with consumer spatial behavior retrieved from various sources such as online shopping navigation data, retailer loyalty cards, and consumer paths to purchase. Proximity in the geolocation context, however, suffers from a real polysemy due to its variations such as functional, relational, geographical, temporal, material, immaterial, and cultural (Cliquet & Baray, 2020). Nonetheless, in terms of proximity marketing, it involves targeting consumers with tailored adverts based on how near a consumer is to a specific location. Lastly, the partnership of mobility and geolocation covers a bigger idea. Unlike mobile, which is primarily

about the devices, mobility is about the constant connection of consumers while on the move. Connecting it to geolocation opens an opportunity to capitalize on LBM.

Geofencing Technology and Push Notifications

One application of GIS that is becoming prevalent in the business world is geofencing technology. In a brief explanation, a geofence is a virtual perimeter set in a real-world geographic area to monitor the entrance and exit of a person or an object through a device like a smartphone. Rahate and Shaikh (2016) discussed various applications of geofencing infrastructure used as location-based services. For example, geofencing can be used for child safety management, where parents can be notified whenever their child enters or leaves a particular area. Gilmore (2019) applied this idea in his wearable tracking device called *Jiobit* where geofencing is used to emphasize securitization. A similar concept was executed within the law enforcement community for geospatial monitoring of community-released offenders (Heaton, 2016) and to improve national security (Akinode, 2011). In deriving actionable information from the increasing volume of data, geofencing technology is crucial to leverage advanced analytics. Another application of geofencing is message notification applied as a mobile marketing strategy (sometimes called geofencing marketing). The goal of the geofencing marketing strategy is not to advertise to anyone, but to select a portion of the population and deliver tailored advertisements.

Common examples of a geofencing marketing strategy are location-based push notifications and customized messages/alerts sent by a software application to a user entering/exiting a digital fence. This strategy and its acceptance have been examined many times in the literature. For instance, Wohllebe (2020) conducted a systematic review about the influence of the frequency of sending push notifications. According to the 17 research articles, the application usage increases with frequency but too high a frequency can be perceived as disturbing. Meanwhile, Glay (2019) examined the importance of time and relevance to fill a gap in the real-time and push mobile marketing literature. The findings show that an effective push mobile marketing campaign must be accomplished at the right moment and relevant to consumers' needs relative to that moment. In addition, Rigollet and Kumlin (2015) investigated the use of push notifications as a marketing tool to trigger impulse buying behavior. Aside from frequency, time, and relevance, other factors include emotional appeal, localization, consumer involvement, privacy, and incentives. These acceptance studies on push notifications serve as a basis for how to design and develop such a tool in a form of mobile applications.

Figure 2. PushMapp Contexts: Geofence, Spot, and Analytics. Geofence defines the virtual perimeter of a targeted advertisement, Spot displays the relevant information of a selected location, and Analytics determines the behavior of opted-in app holders through their historical location data.

RESEARCH METHODS

Inspired by user-centered research, the present study utilized a parallel-iterative approach for the development stage and a mixed-methods design for the evaluation stage. The combination of iterative and parallel design models allows for multiple versions (i.e., iterations) to reduce usability problems, and multiple alternatives (i.e., artifacts) to construct a single merged design.

Such an approach is valuable for complex and large projects that require extensive data and functionalities yet are subjected to early tests and evaluations. With *PushMapp*, the use of a parallel-iterative approach means that the application features, pre-specified geofences, and location spots were concurrently added throughout the six-month project lifecycle. As early as the first month, the prototype was already accessible for a series of beta tests. Although the project was incomplete yet at this stage, informal early feedback was already obtainable which was utilized to address the emerging issues immediately. For the usability evaluation, a mixed-methods design is warranted to produce more reliable and valuable outcomes for mobile application usability studies (Weichbroth, 2019). Garcia et al. (2020) stressed that user-centered design and usability studies are recommended to utilize mixed-methods to cover multifaceted aspects and dimensions that are both qualitative and quantitative. In addition, they found that a mixed-methods needs analysis is essential before starting a large application development project.

Development

The first task of the present study was to design and develop *PushMapp* – a geomarketing mobile application that harnesses the power of real-time geographical data and geofencing technology. This location-aware service aims to provide a platform for businesses and advertisers to deploy their LBM strategies and help consumers to discover the world with contextual experiences by leveraging location and personalization. Specifically, *PushMapp* is focused on three different contexts such as *Geofence*, *Spot*, and *Analytics* (Figure 2). These contexts cater to the whole process of managing LBM strategies and their success monitoring. The Geofence feature is responsible for defining the virtual fence or perimeter of a targeted push notification advertisement. Business owners can create geofences by entering an address or by placing a marker on the map and setting the radius of the virtual fence. Once a user enters the geofence and is part of the target group, a pre-specified event (e.g., notification of special promos) will be executed. The Spot feature, on the other hand, gives users relevant location information based on their search queries. It is also designed to show recommended places according to their current location and/or previous search queries as well as how to get there with real-time traffic information from Google Maps. Lastly, the Analytics feature saves historical location data to establish the basic behavior of opted-in app holders. Key metrics include the frequency of visits by a particular visitor within a certain geofence, types of visitors, timeframe since the last visit, and the time duration spent on the geofence. Geofence visitors are categorized as new (i.e., those who never visited any location in the currently selected location set), returning (i.e., those who have previously visited a location), or repeat (i.e., those who make more than one visit to a location). Not only will it bring essential data to study consumers but also the possibility of predicting their behavior using machine learning. The prediction, however, is not part of this study but can be used for future research. Other features and application screenshots can be seen in Table 1 and Appendix B, respectively.

Table 1: PushMapp Geomarketing Mobile Application Features

Features	Purpose
Geofence	Target a single or multiple geographic location by setting up a radial digital fence to personalize in-app marketing.
Spot	Deliver relevant information about places searched by users such as direction, ratings, reviews, and more.
Analytics	Record historical location data and other key metrics to find out the behavior and personality of opted-in app holders.
Place Detection	Detect when a user enters whitelisted places like sister companies outside a geofence or blacklisted places like your competitors.
Competitive Pathing	Generate a comparative result in terms of users' visits and behavior between your stores and other location of interest (or businesses).
Real-time Mapping	Track geographical data of users and display their device position on the built-in map within the mobile app in real-time.
Geolocation Sharing	Let users activate the invisible mode, or share their geolocation in real-time with business owners and/or other users of the app.
Marketing Automation	Send location-based ads with consideration to personalization and relevance as they approach or leave a geofence.
Schedule Campaigns	Set the schedule of your marketing campaigns at a specific time and date based on the recipient's time zone for time-sensitive promotions.
Ad Delivery	Choose how and where to deliver your marketing advertisements: push notification, in-app message, or inbox storage.
Customer Preference	Determine the preferences of in-app users in terms of spots they like and dislike based on the historical data recorded in the Analytics.
Proximity Messaging	Alert customers who are already in shopping mode regarding nearby business stores and other spots like a park, church, school, etc.

Participants

The inclusion of diverse participants was purposely accomplished not only to cover the target users (regular consumers and business owners) but also to gather feedback from hobbyists and professionals (travel bloggers and mobile application developers). Travel bloggers represent the travel consumers considered as a moving target who constantly visit different places. Their perceptions of push notification advertisements based on where they go are valuable in the development of *PushMapp*. On the other hand, regular consumers are expected to offer their insights in terms of their intent to opt-in as well as advertisement relevancy since they have diverse interests that must be peeled layer after layer to ensure that *PushMapp* will only send the notification to the right group of people. Feedback to the functionality of the platform, particularly in setting up highly targeted location-aware campaigns, is projected to come from the business owners. Lastly, the subgroup of mobile application developers is expected to generate advice on technical aspects from mobile application design and features to mobile user experience. In total, 41 participants were part of the present study from start to finish.

Interviews

Semi-structured interviews were conducted with participants in two different timelines (Figure 3). The first timeline was dedicated to travel bloggers and mobile application developers who assessed the initial version. This beta evaluation was centered on targeted push notification advertisements launched in different places and businesses with pre-specified digital fences (for travel bloggers) and functional user experience from general application development guidelines (for mobile application developers). Sample interview questions include "*Describe your experience from using PushMapp?*" and "*Tell me your thoughts about the time you received a push notification from PushMapp*". The second timeline was dedicated to business owners and consumers who evaluated the revised version with a focus on functionality, privacy concerns, relevancy of ads, intent to opt-in, and location accuracy. Sample interview questions include "*How would you use PushMapp to gain more customers?*" and "*Describe the functionality of PushMapp that will make you use such application*". Instead of face-to-face meetings, Skype was used to reach the geographical spread of participants for both interview timelines. Aside from the obvious reason for diverse participants, the data collected did not require responses that are neither affected by physical reactions nor influenced by the interview method. Moreover, the interview had the same guide that includes the same open-ended questions. Lastly, the Skype interview was only used as a complementary data collection tool alongside other data collection methods which makes it more invaluable as a tool for qualitative research interviews (Lo Lacono et al., 2016).

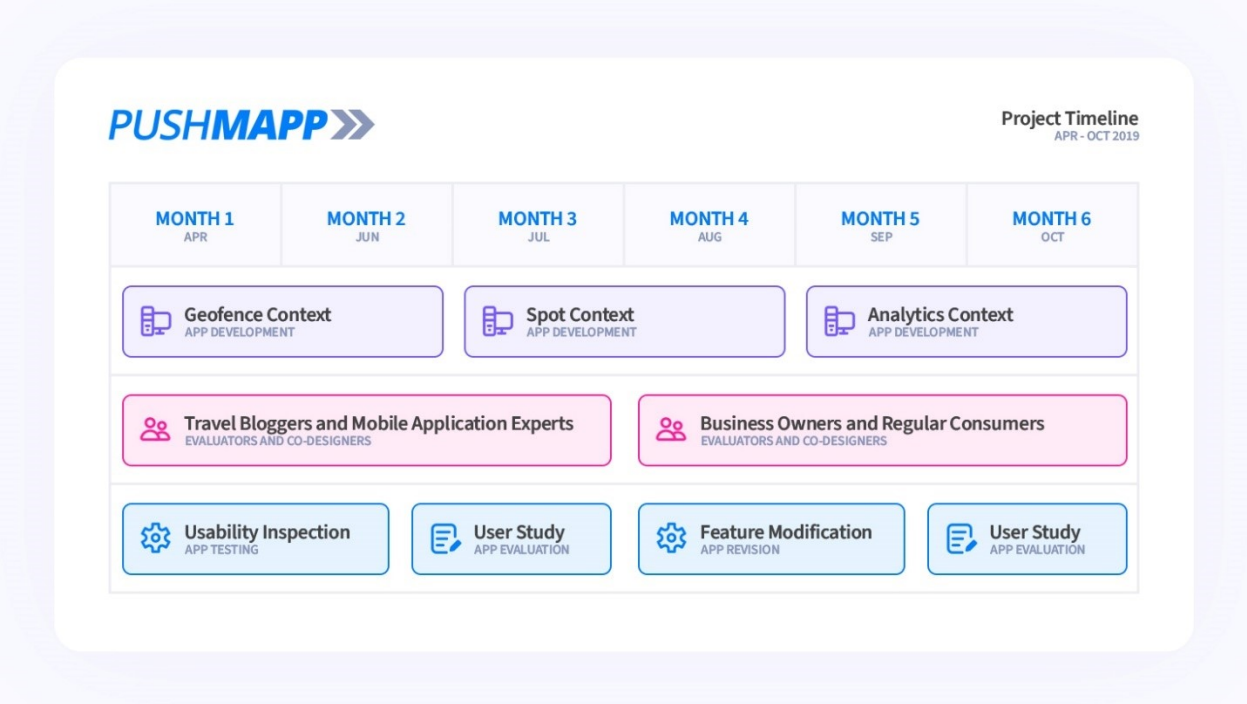

Figure 3. Study timeline and distribution of tasks, development, and participants

Questionnaires

Aside from the interview guide questions, two quantitative questionnaires were prepared. Both questionnaires were answered by participants to evaluate the initial and revised versions of *PushMapp*. The first questionnaire was System Usability Scale (SUS), with scores from 0 to 100 (70 is generally considered usable), which is intended to collect users' subjective ratings of the mobile application's usability (Brooke, 1996). The same instrument was used by Kortum and Sorber (2015) and Garcia et al. (2021a) to measure the usability of mobile applications in multiple experiments. The second questionnaire was focused on mobile application utilization based on the Unified Theory of Acceptance and Use of Technology (UTAUT2; Venkatesh et al., 2012). This instrument is composed of constructs such as performance expectancy, facilitating conditions, hedonic motivation, habit, social influence, effort expectancy, and price value. Numerous studies from various fields such as education (Ameri et al., 2020), health (Yuan et al., 2015), and business (Owusu Kwateng et al., 2019) have employed UTAUT2 to evaluate users' ratings, acceptance, and perceptions of mobile applications. Moreover, (Correa et al., 2021) also employed UTAUT2 to determine the factors that influence the adoption of geolocation and proximity marketing technologies. Both questionnaires, SUS and UTAUT2, had online custom-coded forms with specific access codes assigned to each participant developed using *HTML5*, *CSS3*, *PHP,* and *MySQL* and hosted on a private server.

Usability Testing

Two of the general categories of usability testing methods were employed in the study: *usability inspection method* and *user study*. The usability inspection method served as the first layer of testing whereas a private inspection (without end-users) through cognitive walkthroughs and heuristic evaluation was performed to trim down the obvious usability problems as early as possible. Then, the next layer of the usability test was performed by real users (user study) to confirm the design and development decisions made during the usability inspection and find any problems that may have been overlooked. For this user study, target users performed predetermined tasks that reflect realistic usage scenarios without in-person training. These tasks include setting up a geofence, spot designation for making contextual experience in a particular location, downloading campaign analytics reports, and scheduling marketing campaigns, to name a few. To preserve the truth in task performance, it was made clear to the participants that *PushMapp* was the one being evaluated and not their execution of each task. The main usability instrument used in this study was the ten-item SUS – a validated tool that provides a quantitative measure of learnability and user satisfaction (Brooke, 1996). The number of participants enrolled in the usability test (n = 41) is more than the standard five-user assumption (Nielsen, 1993).

Analysis

Both quantitative and qualitative data analyses were performed in the present study: SUS scores and mobile application utilization rating for the former and semi-structured interviews for the latter. With consent from the participants, the Skype interview was recorded using free audio

and a video recorder called *Pamela*. Moreover, it was transcribed verbatim, translated to English, and coded using *Atlas.ti version 7.2* – a workbench for qualitative analysis. Inductive analysis was employed to develop a coding framework by starting with priori categories using UTAUT2 constructs such as performance expectancy, facilitating conditions, hedonic motivation, habit, social influence, effort expectancy, and price value. Additional generated codes that emerged from the transcripts were added as well. Themes were generated using a thematic analysis resulting in the assessment of patterns and experiences in using *PushMapp*. For the quantitative part, a *two-tailed t-test* was employed to compare the responses between two versions evaluated in a separate timeline. Lastly, descriptive statistics were used for the summarization of the quantitative questionnaire responses and demographic information.

Figure 4. Sample push notification upon user's arrival in the geofence

RESULTS

The principal findings reported in this study were based on the results of both quantitative and qualitative analyses in a two-phase evaluation from April 27 to October 24, 2019. Participants ranged in age from 21 to 42 years (mean 26 years) and were composed of 23 males and 18

females. In terms of smartphone brands, participants used Samsung (12/41, 29%), Oppo (9/41, 22%), Cherry Mobile (13/41, 32%), and Apple (7/41, 17%). As for the mobile operating system, participants used Android (36/41, 83%) and iOS (7/41, 17%). The majority of participants (39/41, 95%) stated that they used the Internet daily, with the remaining participants (2/41, 5%) using it at least once a week. In their daily online access, smartphones were the most used device (24/41, 59%) followed by tablets (7/41, 17%), laptops (5/41, 12%), and desktop computers (5/41, 12%). Finally, the online activities of participants are composed of social media (39/41, 95%), online shopping (36/41, 83%), school-related works (13/41, 32%), and news and weather reports (21/41, 51%).

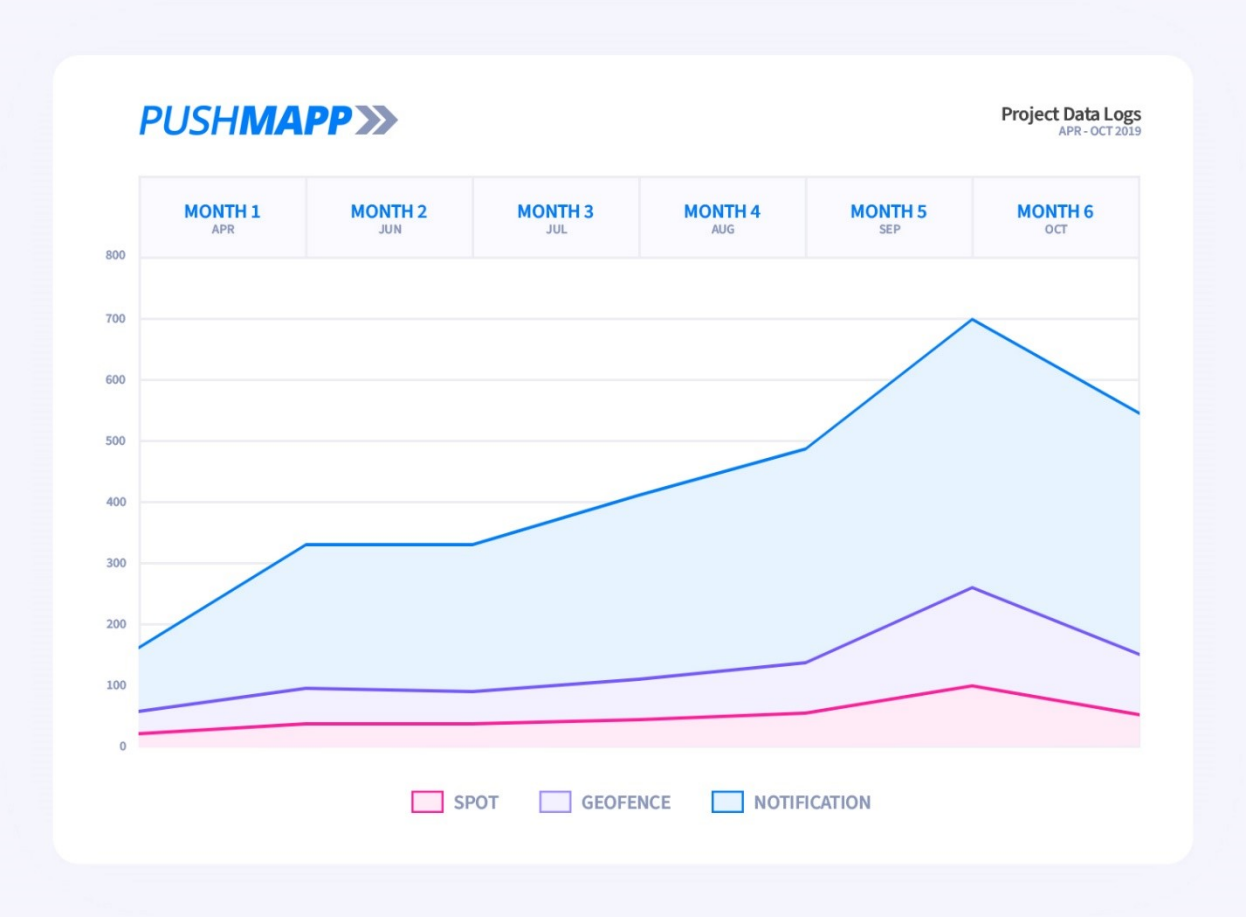

Figure 5. PushMapp data logs within six months of development and experimentation

Experimentation

Several transactional data were recorded, collected, and stored in a database while participants used *PushMapp* in the real world for six months. This includes a geofence audit trail (i.e., the record of entry, dwelling, and exit of a consumer in a particular configured geofence and spot), a marketing campaign plan (i.e., the A/B testing of push notifications and its strategic intent in spots), and LBM campaign results covering 150-days period. Within the span of six

months, 2,084 targeted push notifications (*mean* = 50.83) were sent, 547 geofence (*mean* = 13.34) were triggered, and 337 spots were visited (*mean* = 8.22). It can also be seen in Figure 5 that most of the recorded logs happened during the last two months of the project. This can be attributed to the larger number of campaigns launched through and geofences added to the application.

Geofence Audit Trail

As part of the application features listed in Table 1, the Analytics saves historical location data and other key metrics to determine the basic behavior and personality of opted-in app holders. In Table 2, a sample data file generated from the application consisting of user identification number (User ID), business identification name (Spot), the time of arrival (Entry), dwelling (Visit), and departure (Exit) within the virtual fence, and the fence identification name (Geofence). This basic data set provides insights to business owners about customer behavior.

Table 2: Sample Generated Report using PushMapp Analytics Context

User ID	Spot	Entry	Exit	Visit	Geofence
MBG04124	Store #191	05/14/19 04:43 PM	05/14/19 04:47 PM	4 mins	Sector 19A
MBG03210	Store #030	05/14/19 04:45 PM	05/14/19 05:01 PM	16 mins	Sector 30A
MBG04124	Store #193	05/14/19 04:51 PM	05/14/19 04:53 PM	2 mins	Sector 19C
MBG03210	Store #059	06/09/19 07:30 PM	06/09/19 07:33 PM	3 mins	Sector 50H
MBG04124	Store #021	06/12/19 02:30 PM	06/12/19 02:43 PM	13 mins	Sector 20A
MBG04124	Store #022	06/12/19 02:49 PM	06/12/19 02:51 PM	2 mins	Sector 20B
MBG09213	Store #512	06/25/19 10:49 AM	06/25/19 10:50 AM	1 min	Sector 51B
MBG03210	Store #059	06/29/19 06:52 PM	06/29/19 06:54 PM	2 mins	Sector 50H
MBG07174	Store #030	07/04/19 05:12 PM	07/04/19 05:14 PM	2 mins	Sector 30A
MBG01112	Store #511	08/21/19 03:41 PM	08/21/19 03:43 PM	2 mins	Sector 51A
MBG02310	Store #400	08/21/19 05:17 PM	08/21/19 05:20 PM	3 mins	Sector 40A
MBG03210	Store #139	08/25/19 02:31 PM	08/25/19 02:37 PM	6 mins	Sector 13H
MBG01112	Store #030	08/26/19 05:24 PM	08/26/19 05:25 PM	1 min	Sector 30A
MBG05141	Store #022	08/28/19 10:36 AM	08/28/19 10:45 AM	9 mins	Sector 20B
MBG09213	Store #022	08/28/19 08:26 PM	08/28/19 08:29 PM	3 mins	Sector 20B
MBG01112	Store #021	09/01/19 01:41 PM	09/01/19 01:42 PM	1 min	Sector 20A
MBG03210	Store #059	09/02/19 08:01 PM	09/02/19 08:03 PM	2 mins	Sector 50H

For instance, user *MBG03210* visited *Store #030* on May 14, 2018, for 16 minutes but user *MBG07174* spent only 2 minutes in it on July 4, 2018. While it will take a few more steps to identify and cross-examine user personality via the Customer Preference feature, the raw data can give business owners perception of what went wrong, or right, on the said example immediately.

Was something out of stock on July 4? Did the business conduct a marketing promotion like sale discounts on May 14? Another example is user *MBG04124* who spent 13 minutes on *Store #021* and 2 minutes on *Store #022* on June 12, 2018. With this data, business owners can compare the two spots via the Competitive Pathing feature and validate the average number of visits and duration for each store if it jives with the result in the example. The data also shows something about users who shop during and after workday on a certain store and time, e.g., user *MBG05141* spent more time on *Store #022* in the morning (9 minutes) but user *MBG09213* spent less time later that day (3 minutes). The shopping pattern may also be tracked, for instance, *Store #030* was visited by three users (*MBG03210*, *MBG07174*, *MBG01112*) on different dates (May 14, July 4, and August 26, 2018) all at around 5:00 in the afternoon while user *MBG03210* spent only less than 5 minutes in *Store #059* in three different dates (June 9, June 29, and September 2) during the evening. These are just some examples of how the location data file generated by the app can be analyzed and put into use. Although not part of the scope, the dataset could be used for behavior prediction using machine learning as recommended in the latter part of the paper.

Table 3: Sample Marketing Campaign Plan with A/B Message

Start	End	Spot	A/B Message	Strategic Intent
05/01/2019 12:00 AM	09/30/2019 11:59 PM	Tribal Streetwear	A. Here at SM Manila? Visit our store on the 3rd floor. Discounts and treats await you! B. Visit our store on the 3rd floor and receive discounts and treats here at SM Manila.	Drive in-store traffic and sales
05/01/2019 12:00 AM	09/30/2019 11:59 PM	Gold's Gym	A. We miss you here at Gold's Gym! Drop by here if you have some spare time today. B. Health is wealth! Drop by here at Gold's gym and start losing or gaining weight in a healthy way.	Encourage customers to return
05/01/2019 12:00 AM	09/30/2019 11:59 PM	Starbucks	A. Hi *[name]*! You are near Starbucks Morayta. Currently 50% off on your favorite drinks. B. Heads up, *[name]*! Currently 50% off on your favorite drinks here at Starbucks Morayta.	Drive in-store traffic and sales
05/01/2019 12:00 AM	09/30/2019 11:59 PM	FEU Institute of Technology	A. Visit our campus at P. Paredes St. here at Morayta and learn more about our programs. B. Visit us now and take the FEU College Admissions Test (FEU-CAT) for free.	Drive potential enrollees

Marketing Campaign Plan

Learning more about consumer behavior has been a cornerstone in marketing. By following this idea, *PushMapp* allows marketers, advertisers, and business owners to create a marketing plan with the provision of A/B Testing. With this feature, users can set up and launch marketing campaigns according to strategic intent, start and end of the campaign, business spot (i.e., where the campaign is associated), and two variations of push notifications. Table 3 shows examples of marketing campaigns executed on various spots with different intents and settings. In

the case of split testing, *PushMapp* allows users to make a comparison between two push notification messages and identify which variation of the message is successful in terms of conversion rate (the number of push notifications sent divided by the total number of push notifications read).

LBM Campaign Results

As part of the Analytics context, the result of marketing campaigns is also available to users. Table 4 shows a compilation of some of the actual campaigns launched via PushMapp within 150 days. For instance, *Store #191* encoded a campaign and delivered push notifications to 12 users who entered a geofence. This campaign yielded 50% in spot entries and 83% in advertising reads, which can be used by business owners as indicators of campaign success. In this example, however, four users did not enter the store even though they receive the message.

Table 4: Sample Campaign Results within 150 days

Spot	Ads Sent	Spot Entries	%	Ads Reads	%
Store #191	12	6	50	10	83
Store #193	5	3	60	5	100
Store #759	3	2	67	3	100
Store #512	8	5	63	7	88
Store #059	4	3	75	4	100
Store #030	2	2	100	2	100
Store #511	16	5	31	14	88
Store #400	5	2	40	4	80
Store #139	11	7	64	11	100
Store #022	2	1	50	2	100
Store #021	15	12	80	14	93

Evaluation

From the initial to the revised version, the usability has significantly improved from 45.67 ± 11.21 to 79.41 ± 19.64 (p = 0.03; scale 0 to 100, with 100 being the best usability) and constructs from UTAUT2, particularly performance expectancy, effort expectancy, and hedonic motivation, appeared to have a pivotal role in a location-based marketing mobile application (Figure 6). Through the involvement of end-users in the project development and by constantly incorporating their qualitative feedback, the usability scores and mobile app utilization ratings were substantially improved. End-user representatives from multiple subgroups turned out to be indispensable co-designers and collaborators by generating ideas, giving feedback, revealing their needs, and testing the mobile application to ensure product feasibility. The participatory approach of the study also exposed the difference in perceptions and expectations of various types of users when engaged in the development and evaluation of a mobile application (See Appendix A). For

instance, travel bloggers prefer to be notified about promotions specific to their niche such as hotel accommodations, travel accessories, cheap flight tickets, etc. while consumers did not have any problem with the type of notification so long as it gives them promotional discounts.

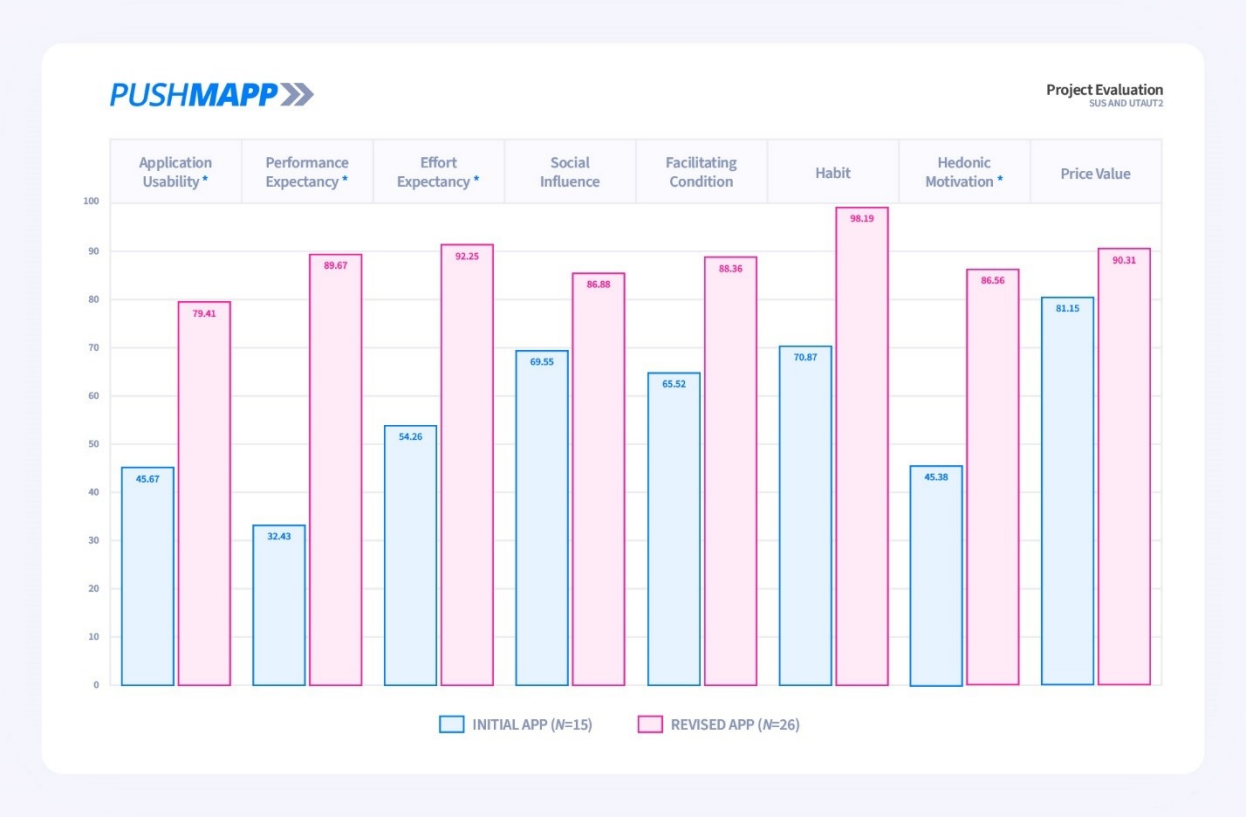

Figure 6. User-reported usability scores and the likelihood of mobile app utilization from ATAUT2 constructs were rated on a scale of 0 to 100, with 100 being the highest score. *p < .05 for comparison between mobile application versions.

Performance Expectancy

The focal point of a business mobile application is to provide value to consumers by making their lives convenient and more efficient. When an application achieves this goal, it also accomplishes performance expectancy, which deals with how a particular technology provides benefits to consumers in performing certain activities. In this case, PushMapp aims to provide a two-way beneficial relationship between businesses and consumers. First, businesses could easily reach their target consumers through location-focused campaigns. On the other hand, consumers could enjoy the benefits of receiving instant, non-intrusive notifications of promotions and discounts. During the first batch of evaluations, the mean score for performance expectancy was 32.43 ± 12.52, and most negative feedback stems from constant push notifications. Such risks of sending an excessive number of notifications, as warned by Barwise and Strong (2002), may result in irritation and prompt users to discontinue usage. Participants urged to "[...] *limit the notifications to avoid messy lock screen notification*" [P2] if it is to meet a higher rating. To mitigate

this risk, two additional features were added during the iteration stage. In the settings menu, there are additional options that permit consumers and business owners to (1) limit the number of notifications to be received daily and (2) set the number of minutes as a backoff time for multiple push notifications, respectively. After the iteration, the mean score for performance expectancy has significantly improved from 32.43 ± 12.52 to 89.67 ± 10.21. The final version of PushMapp "[...] *performs what it's supposed to do*" [P15] and "[...] *delivers push notifications in the right time without being irritating*" [P16], and in turn provides value to consumers which adhere to the performance expectancy concept.

Effort Expectancy

As mobile services are getting increasingly complex and packed with a wide array of features, usability issues are raised. Target users lose the intelligible overview of the service, which results in abandonment after a single use (Tiongson, 2015). For this reason, usage and retention have become a main concern in the mobile application markets. Effort expectancy, the degree of ease associated with the use of technology, is one aspect eliciting positive emotion that addresses this concern and increases usage and retention (Tang, 2016). In a study conducted by Urban Airship (2016), push notifications that are frequent and relevant could increase retention rates based on the behavior of 63 million application users. Impersonal and irrelevant notifications, on the other hand, can ultimately prompt uninstall. Hence, designing the perfect notification experience (e.g., simplicity of the mobile user interface, opting for descriptive texts, notification sounds, accessible notification settings, easy setup for marketing campaigns, etc.) should be on the list of concerns when developing a geomarketing mobile application. The "[...] *simplicity of the app*" [P5] and the "[...] *straightforward user interface*" [P9] must also be considered as commented by the participants. From the initial score of 54.26 ± 16.25, the rating of the effort expectancy was significantly improved to 92.25 ± 24.67 because end users were part of the development team to validate and confirm the ease associated with using *PushMapp*.

Social Influence

The persuasion of other people's opinions on technology adoption was also emphasized in UTAUT2 through the social influence factor. In mobile marketing, social influence is a positive predictor of mobile advertising use (Yang, 2007). During the interview, participants raised one important issue by expressing serious concern about user privacy, particularly on location tracking. Unless there is an assurance of security, "[...] tha*t is the only time I am going to use such application especially there is some news lately of stolen information and some companies selling it to other businesses*" [P2]. For travel bloggers, it is "[...] *scary that an application knows where I am all the time, which places I go, and what restaurants I visit*" [P3]. In push notification marketing using location data, privacy is indeed a pivotal concern for many users and perhaps the reason why the initial app version was only rated 32 in the social influence factor. Consequently, mobile security policies were placed by using the proposed model for tracking mobile users by Atluri and Shin (2007) as a reference. These safeguards include the implementation of an obfuscation technique and an intuitive way to express privacy preferences. The security policy summary was transferred

to a strategic location within the application apart from the modal window shown on first-time users. After the iterations made from the initial to the revised version of the app, the rating was improved from 69.55 ± 12.41 to 86.88 ± 14.93.

Facilitating Conditions

Another factor in UTAUT2 that could influence consumers in adopting technology is facilitating conditions or the perceptions of resources and support in performing a behavior. In the original version of UTAUT (Venkatesh et al., 2003), this factor includes resources availability such as documentation and the technical infrastructure deployed by an organization for stakeholders, which guarantees the quality of the services. As mentioned by a participant during the interview, "*online documentation or better yet, documentation within the app would be beneficial for users*" [P2]. For the initial app, technical documentation was not purposely created due to the incomplete data and features. Nevertheless, from the developer's perspective, documentation (or any step-by-step tutorial on how to use an application) is always part of the project development. Only after the completion of features and data such as geofence and spots, two contextual tutorials were added to guide users in navigating the app features. First was the screen-by-screen tutorial which is responsible for educating first-time users about the application and then the interactive tour which discusses the settings menu for both first-time and returning users. The in-app documentation was enough to improve the facilitating condition rating from 65.52 ± 11.29 to 88.36 ± 16.57. An "*online help*" feature was added as well to complement the mobile version and a "*report a problem*" for an additional layer of support to users.

Habit

Since the dawn of mobile applications, users have been changing their lifestyles by incorporating apps into their daily activities. Consequently, mobile applications influence one's life habits (Oulasvirta et al., 2012). Its impact is known in today's generation because a daily routine could change every time a new application is blended into one's life. In UTAUT2, habit is a factor that deals with the extent of people who tend to perform behaviors automatically because of learning. Depending on how users perceive and mold their habits within the usage of a mobile application, the habit construct can either strengthen or weaken the behavioral intention toward a technology. Although habit was operationalized in two distinct facets such as prior behavior and that behavior is automatic, one lesson could be obtained from this. In any mobile application, such a factor must be engraved throughout the development process. This lesson is about ensuring that the "[...] *learning curve in using the mobile app is not difficult to achieve because it is simple*" [P5] and the user interface gives a familiar feeling. In systems design, users tend to have the feeling of familiarity when they think they have 'seen' the interface on other mobile applications they normally use. The evaluation of the habit factor in UTAUT2 resulted in a rating of 70.87 ± 11.76 on the initial version and 98.19 ± 27.41 on the revised version by using familiar screens that are consistent and predictable, and more appropriate with the goal of geomarketing.

Hedonic Motivation

There are mobile applications (e.g., commerce and games) that heavily rely on intrinsic motivations. More specifically, enjoyment is considered more important than function as a determinant of users' continued usage behavior. Hedonic motivators were found to be more influential than utilitarian motivators, and one way to cultivate pleasure is through personalization (Ho, 2010). At first, the main form of personalization in PushMapp is that location-focused advertisements are being delivered to all in-app users whenever they are inside a geofence. As pointed out in the first batch of interviews, however, one participant claimed to receive "[...] *a notification of 10% discount on the mattress*" [P3] during travel which is not a beneficial promotion for someone who is not interested in buying this product as of that moment. Therefore, the mobile personalization service of the application must be deeper than just filtering out the subset of users based on their location. As mentioned in the literature, relevancy is important (Glay, 2019). Therefore, it would be valuable if PushMapp could tailor out promotions based on user preferences and historical data instead of a one-size-fits-all notification. Borrowing from the promotion algorithm technique used by Zhu et al. (2016) and Garcia et al. (2021b), a filtering recommender approach was employed to intelligently plot user preferences based on their basic personality and application usage behavior. For future works, machine learning can be integrated as a native feature of the mobile application to avoid expending effort and resources on the personalization setup. Apart from personalization as the main setback on this factor, nevertheless, the overall rating of the hedonic motivation has significantly increased from 45.38 ± 12.25 to 86.56 ± 19.67.

Price Value

Sales promotion is a strong influencer in convincing consumers to purchase products impulsively. The best thing about offering incentives, such as discounts and special offers, is that mobile users are more willing to receive push marketing materials (Barwise & Strong, 2002). In UTAUT2, price value refers to the tradeoff between the perceived benefits of an application and the monetary cost of using it. As for the evaluation of *PushMapp*, the mean scores were 81.15 ± 21.35 (initial) and 90.31 ± 25.47 (revised) which started as and remained high. This is expected since the main function of *PushMapp* is to deliver push marketing materials that contain incentives straight to users' mobile devices. When consumers get benefits from a mobile service, they are more likely willing "[...] *to receive more notifications regarding promo offers and discounts*" [P7]. Similar findings were reported by Tsang et al. (2004) and Barwise and Strong (2002) whereas the willingness of consumers to receive mobile marketing materials, such as promotions and campaigns, through push notifications has a positive correlation with incentives. Consumers are also more likely to accept mobile advertising when they have a positive attitude and when they feel that it is useful (Ponce & Ugalde, 2021). Therefore, it is obvious that mobile users are more likely to use a mobile service, particularly an incentive-driven mobile application when it is perceived as beneficial. For this reason, push notifications should be considered an integral component of mobile commerce whose objective is to drive customer engagement, bring them to the revenue funnel, and convert them into sales.

DISCUSSION

Principal Findings

The present study explored the development of a geomarketing mobile application designed for launching LBM campaigns and assessed its usability and utilization using SUS and UTAUT2, respectively. Perhaps most notably, a strength of this paper is the employment of a parallel-iterative design, which gives an opportunity to establish two timelines of usability evaluation for initial and revised *PushMapp*. The usability of mobile applications is a key attribute of product quality that determines the success of a project (Dourado & Canedo, 2018). However, similar existing studies did not incorporate some form of user-centered methodology as pointed out by Bauer and Strauss (2016). For instance, Shoaibi and Rassan (2012) developed *MALBS* (Mobile Advertising Using Location-Based Services) system to establish two-way communication between subscribers and advertisers. Aside from the missing evaluation of the final product, usability testing was likewise not included. Hence, there is a possibility of having unsolved usability problems. Similarly, Evans et al. (2013) developed *iMAS* (Intelligent Mobile Advertising System) to offer location-based services. Although there was a real-world environment testing, usability evaluation was not included as well. Furthermore, these studies did not recruit end-users that represent the target consumers. For *PushMapp*, the involvement of participants from different backgrounds permits a diversity of qualitative feedback. Without this kind of structure, some usability problems may not be addressed (e.g., unresponsive gesturization is only identifiable by users with access to backend modules). Because of participant diversity, both technical and business sides as well as the perspective of both frontend and backend infrastructure were covered throughout the development life cycle.

Usability Study

In its initial version, *PushMapp* was rated with a mean score of 45.67 ± 11.21, indicating poor usability. Although not directly related to the push notifications, various usability problems were reported by participants during interviews. These issues include unresponsive gesturization, lack of discussion onboarding, small typography, visual clutter, and animation errors due to incompatibility. Unresponsive gesturization is common for newly developed applications, which refers to 'broken' buttons and other user interface elements with non-working functions. On the other hand, the correctness and appropriateness of the onboarding's content are only identifiable by end-users. For instance, the initial onboarding shows a brief discussion about *PushMapp*, however, participants expected step-by-step instructions tailored for new users. In addition, typography and visual clutter cover the design aspects that influence user experience. Finally, animation errors were caused by the desire to integrate an element of interaction design and then improve the user experience. Because of early evaluations, these usability problems were identified and resolved during the early project stage. The next timeline of the usability test yielded a mean score of 79.41 ± 19.64, indicating good and acceptable usability. Application revisions include checking mobile user interface elements one by one to correct bugs, creating

onboarding from scratch with the inclusion of a systematic description of PushMapp for new users, changing font size and family for readability, and verifying compatibility of functions for mobile animations. The upward change in SUS scores was determined as statistically significant (p = 0.03).

Application Utilization

As per the evaluation in terms of utilization using UTAUT2, only the constructs of performance expectancy, effort expectancy, and hedonic motivation did significantly increase from the initial to the revised version. These factors, with the addition of price value, have been found to influence user adoption of geolocation technology (Correa et al., 2021). This extends previous research on mobile marketing and technology adoption by testing LBM in the field. Nevertheless, there are possible reasons as to why these factors did or did not significantly increase before and after revisions. For instance, in the case of facilitating conditions, it may be attributed to the mobile internet usage dependency. Offline usage means the geofence cannot be triggered, thus, push notifications cannot be sent. Although this factor does not determine user adoption, future works should consider establishing an organizational and technical infrastructure as alternative support. Meanwhile, the hedonic motivation significantly increased despite the two recurring issues such as personalization and privacy, which are common for location-based services (Chen et al., 2014; Glay, 2019). This extends the literature (e.g., Bleier & Eisenbeiss, 2015; Yost et al., 2019) that highlights these factors as drivers of reactance by finding an acceptable method (e.g., giving users complete control over how they use the mobile application) to reverse its negative effect.

Limitations

The findings of the present study should be interpreted with caution in the context of the following limitations. First, the sample size included a relatively small number of participants, particularly when categorized according to their subgroups, which may influence the generalizability of the results to other settings. Due to this limitation, the statistical power to determine if there is a significant difference between the ratings of participants according to subgroups (i.e., consumers, travel bloggers, mobile application developers, and business owners) is low. Large sample size may provide a different perspective on how to interpret the ratings of the mobile application. One reason for the small sample size is the difficulty in recruiting participants due to trust (e.g., uncomfortable with having a private mobile application constantly recording their location) and privacy issues (e.g., fear of their data being sold to advertisers). These factors also emerged in the present study. Because *PushMapp* is new and not under the supervision of any reputable mobile application development company, participant recruitment became more challenging. Another reason is the six-month commitment to using the application due to the real-world approach to evaluation. Unlike other usability evaluations that require participants to use an artifact only once or twice, this study needed a longer duration to ensure that geofence will be triggered and push notification campaigns will be activated. Conversely, this experimentation setup is a strength of the present study. Finally, not all features were

investigated (e.g., geolocation sharing, proximity messaging) which, if included, may either affect the ratings positively or negatively.

CONCLUSION

Experiences from this study provide significant insights for any stakeholder who wants to develop a geomarketing mobile application that deploys LBM strategies through push notifications. Such insights include the importance of integrating end users' input throughout the development life cycle, ensuring usability compliance, and conforming to factors of mobile application utilization. End-user involvement, thereby practically making them 'co-designers', has demonstrated the importance of user-centered research design on the success of mobile application development. Moreover, the participatory approach exposed different perceptions and expectations of each subgroup of users, which leads to several important iterations such as personalized advertising messages, more control on the interval and frequency of notifications, contextual tutorials, etc. Next, the usability evaluation through the inspection method and user study technique revealed not only the performance ratings but also qualitative feedback that provides a deeper understanding of the quantitative data. Through these usability testing methodologies, the study was able to determine users' perception of the marketability of LBM representing the perspective of target end-users, and how the iterations between versions should be accomplished with minimal errors and compliant with their needs. The additional layer of investigation through semi-structured interviews contributed a human dimension to the usability evaluation and mobile app utilization. Through this approach, concerns related to security, privacy, advertisement relevancy, and notification overload were determined. To sum up, the lessons learned from the development of *PushMapp* may potentially serve as a model for future mobile applications that are either location-aware or simply a general business mobile application with integration of push notification advertising.

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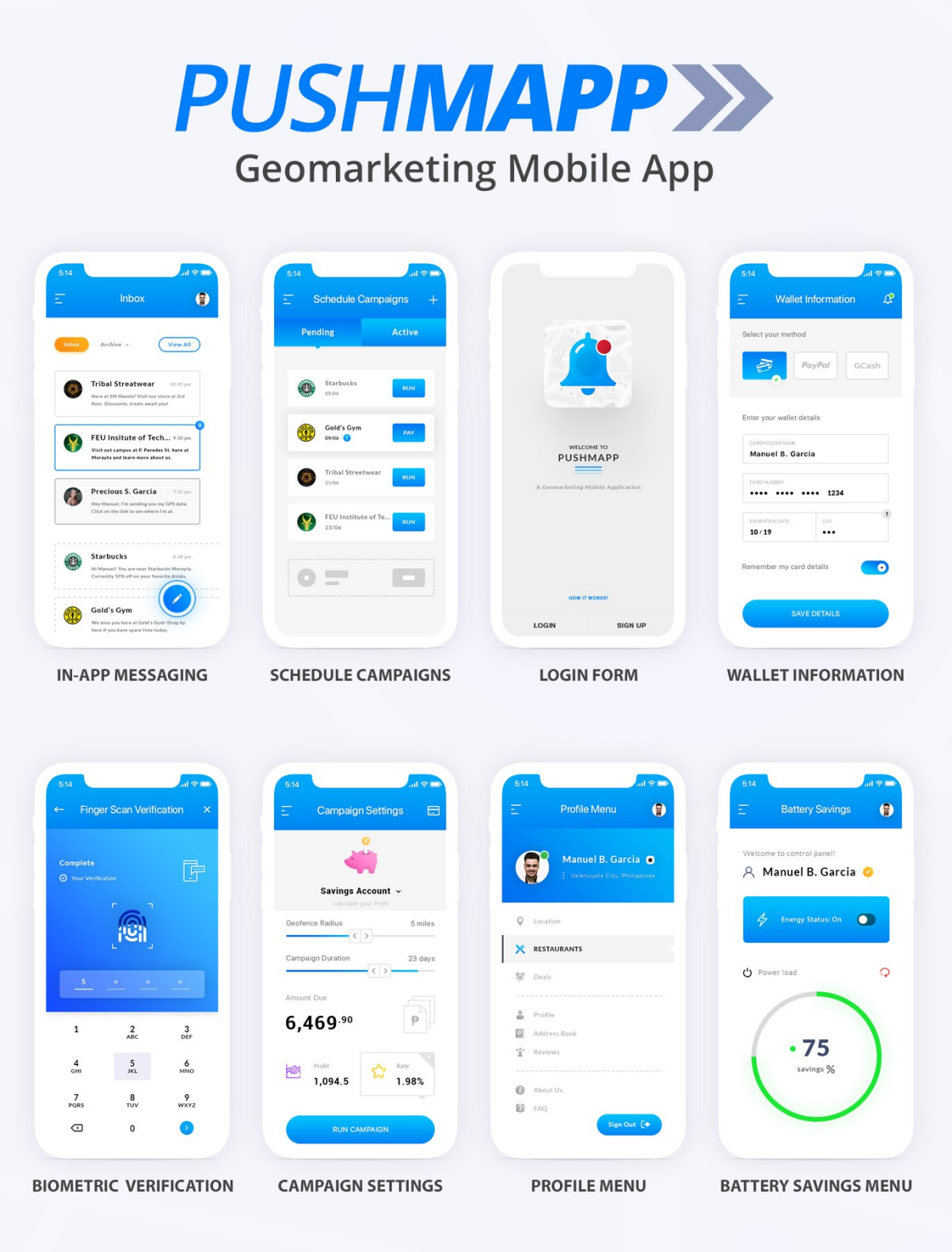
APPENDIX A: Summarized Quotations from the Semi-Structured Interviews related to UTAUT2

Theme	Quotations
Performance Expectancy or the degree to which using technology will provide benefits in performing certain activities.	*During my cultural tour in Intramuros, I keep receiving notifications to the point that I turned off my Wi-Fi connection. At first, I thought it was so cool to receive a promotion around my location, but it was frustrating when the multiple notifications came. I wish there is a menu or option that can limit the notifications to avoid messy lock screen notification that is irritating for users like me*. [P2]
	I think the application is very helpful for someone like me who wants to eat in different places with my friends and loved ones. [P9]
	I used a similar application before, but you have to find promos on your own and it's not tailored to where you are. I think this kind of mobile app should be a feature of other mCommerce applications. [P12]
	If the purpose of the application is technically to send push notifications, then the mobile app performs what it's supposed to do. [P15]
	I like the mobile app because it gives me discounts on the places around me and it gives me detailed information about the place. [P17]
Effort expectancy or the degree of ease associated with the use of technology.	*At first, I thought the app is not working because there's nothing there. I don't know what to do so I tapped everything I can tap*. [P1]
	The simplicity of the app is outstanding. Just install it, maybe tweak a few settings according to your preferences and that's it. It's done. It was very easy to use. [P5]
	The straightforward user interface is what I liked the most because there is nothing much to see in the main application except for the settings, history, and other stuff. [P9]
	All the options were there so I think it is user-friendly in some sense because I can go wherever I want to go in the app. [P12]
	The most important thing for me is the easy access to push notification settings because I can easily choose the number of notifications and I can turn off it for a specific time. [P17]
Social influence or the extent to which users perceive those important others believe they should use a particular technology.	*Security is a big issue in this kind of app because it knows wherever I go and as a traveler, it is a huge concern for me*. [P1]
	I am seriously concerned about the location tracking because the app knows exactly where I am throughout the duration of using it. Unless it is really secured, then that is the only time I am going to use such an application especially there are some news lately of stolen information and some companies selling it to other businesses. [P2]

	I like the fact that I am one of the first people to know about certain coupon codes and that I can share it with my family and friends. I think they are going to love me more because of it. [P6] *If it is possible to contact the business owner about the coupon code then I think the app will be more helpful for users.* [P12] *My mother likes to buy household items and discounts will help her save some money and spend it for the family instead.* [P13]
Facilitating conditions or perceptions of the resources and support available to perform a behavior.	*Good thing the interface is pretty straightforward so it is no brainer to use and navigate.* [P1] *Online documentation, or better yet, documentation within the app would be beneficial for users to guide them in using the app.* [P2] *I've got kids who are wizards in using a mobile phone and I'm sure I can learn how to use it [the app] from them.* [P5] *At least there is documentation even though it is not that long. It is understandable because there is nothing more to discuss.* [P9]
Habit or the extent to which people tend to perform behaviors automatically because of learning.	*When I travel, I often use Google Maps to find my way to go to a certain place. But I like this app more because it shows me places that I can visit while I'm in a certain location. I think I'm gonna be addicted to it because it's very useful for me as a travel blogger.* [P2] *I like online shopping a lot and I use it all the time. I think it's exciting to receive discount codes to be used in my shopping online.* [P4] *The learning curve in using the mobile app is not difficult to achieve because it is simple. I don't see any problem in using it.* [P7] *It will be important for me to keep using the app and receiving notifications for discounts because I buy a lot online.* [P9]
Hedonic motivation or the pleasure derived from using technology.	*The app is fun to use but when I receive a notification of a 10% discount on the mattress, I thought it's not suitable for me. Why should I buy a mattress when I'm traveling? I think it would be more helpful if it notifies me of a discount on hotel rates.* [P3] *I think the app is pretty cool because it can show me places and their details and discounts around me. I was totally happy when it shows discounts on Korean restaurants because I like Kimchi a lot.* [P6] *Personally, I would definitely use a mobile app like this most especially if there are lots of promotions in different parts of the country.* [P9]

	The map is just like Waze so it gives me familiarity with using the app. One upside though is the discounts and vouchers. [P13]
Price value or the tradeoff between the perceived benefits of the app and the monetary cost of using it.	*I like the fact that I receive discounts wherever places I go because it saves me time looking for things to buy*. [P6] *Who doesn't love discounts? Personally, if there are discounts then I will buy the product*. [P7] *I would like to receive more notifications regarding promo offers and discounts using the app because I think it will save me time and money*. [P12] *As a business owner, I think it would be very beneficial for me to reach potential consumers around my area and somehow know their behavior when they visit my store*. [P16]

APPENDIX B: PushMapp Geomarketing Mobile App Features Screenshot



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LET'S COLLABORATE!

If you are looking for research collaborators, please do not hesitate to contact me at mbgarcia@feutech.edu.ph.

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