An App for Who?

An Exploration of the Use and Adoption of Mobile Ordering Applications Among Aging Populations

Christopher Chagnon(✉), Ryan LaMarche, and Soussan Djamasbi

User Experience and Decision Making Lab, Worcester Polytechnic Institute, Worcester, MA 01609, USA
cjchagnon@wpi.edu

Abstract. With the ubiquity of smart and connected devices such as smartphones, and the ease of downloading Apps from various marketplaces, it has become standard practice for companies to enhance their service experience by releasing their own mobile apps. In one particular vertical, Fast-Food Restaurants, these applications have started to offer customers a chance to place mobile-orders. While mobile ordering comes with a variety of benefits such as skipping lines, order customization, and personalization features, it is not clear that current design can benefit all users. This study is part of a larger project that attempts to provide a service experience design that includes the needs of older users. As a first step toward this goal, in this study we assess the adoption, user experience (UX) and overall usability of an actual mobile ordering applications in an organization with respect to generational differences.

Keywords: Mobile ordering · Ageing · Handheld devices · Human-system interaction · Usability · Engagement

1 Introduction

In 2009 Apple Inc. coined their, now trademarked, "There's an App for that" phrasing. At the time this phrase was intended to be used to illustrate the diversity of applications available for download on the Apple iPhone. With over two-million apps available on the Google Play app store and the Apple App Store, and hundreds of thousands of applications on other marketplaces, there truly is an app for almost everything [1]. The breadth and variety of applications available cover nearly every imaginable niche, and have given way to new means of interaction between companies and consumers.

The proliferation of e-commerce, and now with mobile m-commerce solutions, has elicited a new model for service experience that allows for a new means of interaction [2]. Beyond online shopping, the food and hospitality industry is another area that has seen recent innovations in service experience. With big players such as McDonalds, Dominos, and Starbucks releasing their own mobile applications, the industry has followed suit with many players releasing their own services [3–5].

This increase in mobile commerce is due to the ubiquity of mobile devices. According to PEW, mobile technology usage in 2018 is at an all-time high, with about

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95% of Americans owning a cellphone of some kind, and smartphone ownership at 77%, up from 35% in 2011 [6]. When looking at the access to devices across age-groups the breakdown of ownership starts to diverge. As shown in Table 1, while technology adoption is up among older populations, it has yet to reach the same saturation that can be found among younger groups [6, 7].

Table 1. Breakdown of Cell Phone ownership by Age group [6]

Age group	Any cellphone	Smartphone	Cellphone (not smart)
18–29	100%	94%	6%
30–49	98%	89%	9%
50–64	94%	73%	21%
65+	85%	46%	40%

Generational differences between the named generations, Baby Boomers, Gen X, Gen Y (Millennials) and Gen Z, are an oft discussed topic in news media and academia. The generational definitions were created along the idea of birth-cohorts which allow for grouping of people born within common time-periods and cultural movements [8–10]. With terms such as "Digital Natives" coined to describe those who grew up in a world where technologic ubiquity and the proliferation of mobile devices and the internet were not just common, but expected [11–13]. Prior works have examined the use of new media, and the internet among generations, but have found that, while age may be a factor, there are other important social, and financial factors as well [14, 15]. Further works have looked at habits of web-use, and information gathering on the web and have found differences in use, especially with relation to speed and task time, but not in general patterns [16–18].

While computer and internet usage differences among generations have been studied, the increase in ownership and usage of mobile devices has created an interest in investigating the adoption of mobile applications. Food industry companies use a variety of features exclusive to mobile experiences, such as rewards programs, the ability to skip lines, and coupons brands to get users to adopt their applications. Even with many incentives, our initial observations of daily lines of many dozens of people at an on-campus coffee shop shows that many people forgoing the application. These lines are often comprised of a diverse group of people, however, we observed that those using mobile order pickup skewed younger. This observation was the impetus for the creation of a questionnaire to better understand factors that can impact the usage and adoption of the mobile application for food services in an organization, such as the coffee shop that was the focus of this study.

In addition to questions relevant to consumer behavior, we also focused on capturing user engagement. When a system holds a user's attention, they are attracted to it for intrinsic rewards. Hence, user engagement is likely to be an important factor in successful adoption of a technology [19, 20]. In this study our primary question is to understand if there is indeed a significant generational difference in the adoption and engagement for the use of a coffee shop's mobile app. If there is a difference; what factor(s) contribute to this difference?

2 Method

The primary method used in this study was an anonymous self-reported questionnaire that assessed user engagement. Additionally, we asked users questions to better understand the usage and incentives of the food service application.

2.1 Procedure

The questionnaire started with an informed consent statement and overview of the study before following the conditional logic as illustrated below (Fig. 1).

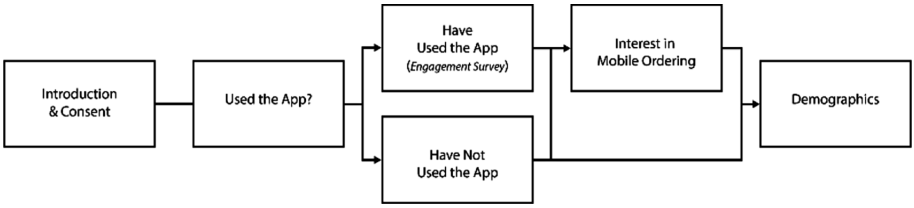

Fig. 1. Process flow for survey logic

Application Usage. To start off the survey we needed to sort respondents into two groups based upon whether or not they had used the mobile application. Respondents were presented with the following options (Table 2):

Table 2. Question 1: Have you ever used the Dunkin' Donuts™ mobile app?

Yes
No
Unsure

Respondents who chose yes or unsure were presented with a set of questions for users who have used the App while those who selected no were presented with a set of questions for users who have not used the app.

Users Who Have Used the App. The first set of questions that users in this group were presented with were regarding frequency of usage. Users were asked how often they use the application and were presented with the following options (Table 3):

Table 3. Question 2a: How often do you use the Dunkin' Donuts™ mobile app?

Several times per day
Several times per week
Several times per month
Several times per year

In order to get a deeper understanding regarding frequency of usage, these users were also asked question 3a, "In a given month, how many days (0–31) do you use the Dunkin' Donuts™ app?"

These users were also asked about the features that they use on a regular basis, and were presented with the following options (Table 4):

Table 4. Question 4a: In the app, which features do you regularly use?

Order On-the-Go (mobile ordering)
Payment
Auto-Reload
DD Perks™ & Offers
Find Locations
Menu & Nutrition

In order to measure engagement among users of the app, questions were adopted from a web-site engagement questionnaire [19]. These users were presented with a seven point Likert scale, and asked to rate their level of agreement with the following statements (Table 5).

Table 5. Question 5a: For the following items, please rate your level of agreement.

The app kept me totally absorbed in using it
The app held my attention
The app excited my curiosity
The app aroused my imagination
The app was fun
The app was intrinsically interesting
The app was engaging

Users Who Have not Used the App. In order to provide some insight to barriers to entry for users who have not previously used the app, these users were first asked why they have not used it and presented with the following options (Table 6):

Table 6. Question 2b: Why have you not used the app?

My phone does not support it
I did not know it was available
I prefer face-to-face interaction
I do not trust it
It seems confusing / complicated
Other

Next we asked the users which features they would be likely to use and presented them with the following list of Dunkin' Donuts mobile application features [21] (Table 7):

Table 7. Question 3b: Which of the following features would you be likely to use?

Order On-the-Go (mobile ordering)
Payment
Auto-Reload
DD Perks™ & Offers
Find Locations
Menu & Nutrition

Users Who Displayed Interest in Mobile Ordering Feature. This set of questions was presented to users who have used the mobile application and regularly use the mobile ordering feature, as well as those who have not used the mobile app but indicated that they would be likely to use the mobile ordering feature.

The first question users were asked was to rank features based on how important the feature was to them, and they were presented with the following features (with a randomized order for each survey participant) (Table 8):

Table 8. Question 6: Drag to rank the following mobile ordering features in order of their importance to you (most to least).

Skip the line
Ordering in advance
Saving favorite orders
Browse the menu
Customize order
Stored payment
DD Perks™ & Offers

Finally, in order to elicit any other feedback, these users were asked question 7, "Do you have any other thoughts or feedback on mobile ordering?"

Demographics. All respondents were asked question 8, "What is your age?" These respondents were then asked about their affiliation to the University, and were presented with the following options (Table 9):

Table 9. Question 9: What is your affiliation to WPI?

Undergraduate student
Graduate student
Faculty
Staff
Alumni
Other

Respondents were also asked about the type of smartphone they primarily use, and were presented with the following options (Table 10):

Table 10. Question 10: What type of smartphone do you primarily use?

Android
iPhone
Other
I do not have a smartphone

2.2 Subjects

Participants for this questionnaire were recruited from the campus population of a University in the United States. The university presented an opportunity to focus on a population with a diverse range of ages, all with experience ordering from the on-campus coffee shop. Respondents (n = 150) ranged from age 18–99 with a mean age of M = 37.42 years (SD = 15.84) (Fig. 2).

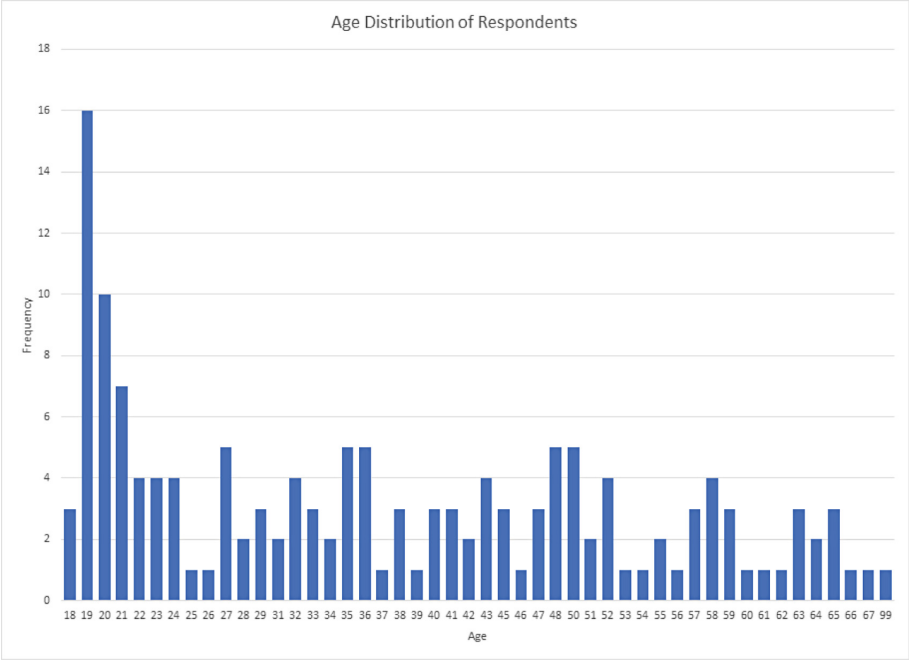

Fig. 2. Age distribution of respondents

For analysis, subjects were classified according to four age groups based on the birth cohort generational construct [8–10].

- "Baby Boomers", aged 56–99, with a population of N = 25 (M = 62.52, SD = 8.29).
- "Gen X", aged 41–55, with a population of N = 36 (M = 47.72, SD = 4.18).
- "Gen Y", aged 27–40, with a population of N = 40 (M = 33.15, SD = 4.17).
- "Gen Z", aged 18–26, with a population of N = 49 (M = 20.53, SD = 1.84).

3 Results

3.1 Application Usage

Application usage among respondents was highest among Gen Y, with similar usage among Gen X, Gen Y and Gen Z between 50–60%, while among Baby Boomers usage was 16% (Fig. 3).

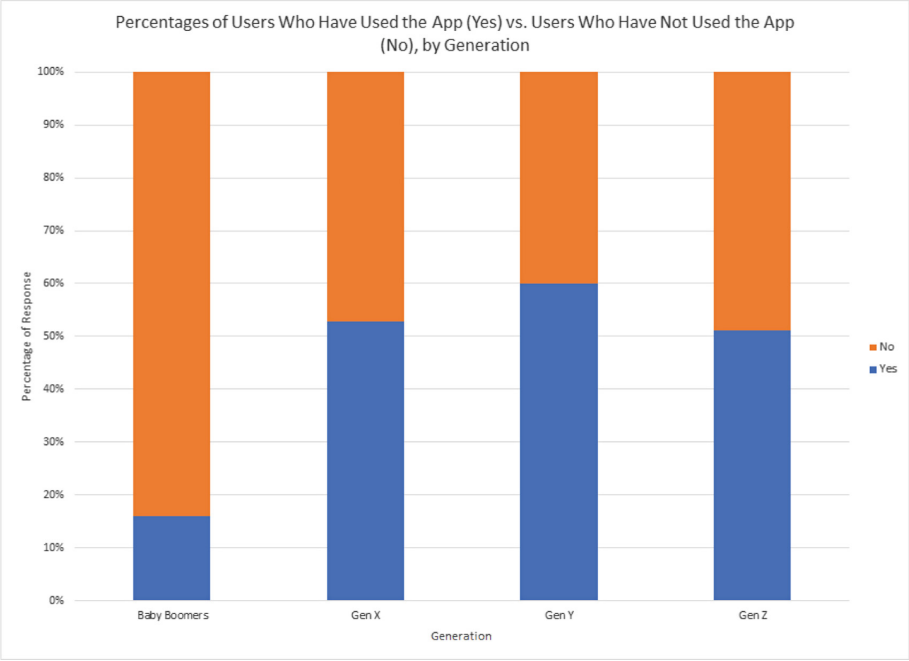

Fig. 3. Question 1: Percentages of Users Who Have Used the App (Yes) vs. Users Who Have Not Used the App (No), by Generation

3.2 Users Who Have Used the App

Most respondents who have used the app indicated that they used it "several times per week" in all four generations. Gen Z, Gen Y, and Gen X each had 1–2 respondents indicate that they use the app "several times per day", and many more who indicated that they use the app "several times per month" or "several times per year." The average number of days per month that the app is used by each generation varies only slightly, with all four averages ranging between 9–12 days per month (Figs. 4 and 5).

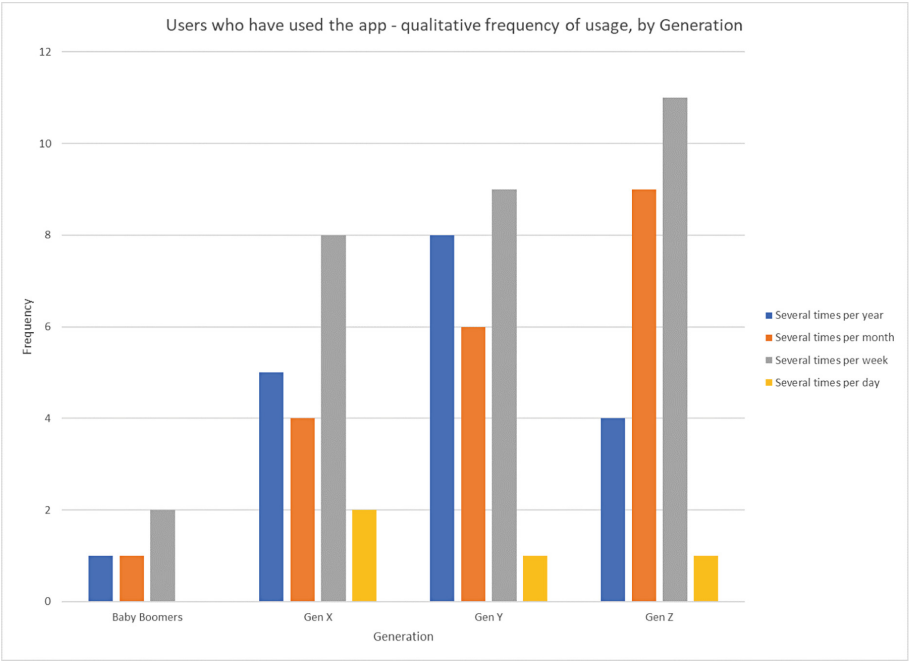

Fig. 4. Question 2a: Users who have used the app - qualitative frequency of usage, by generation

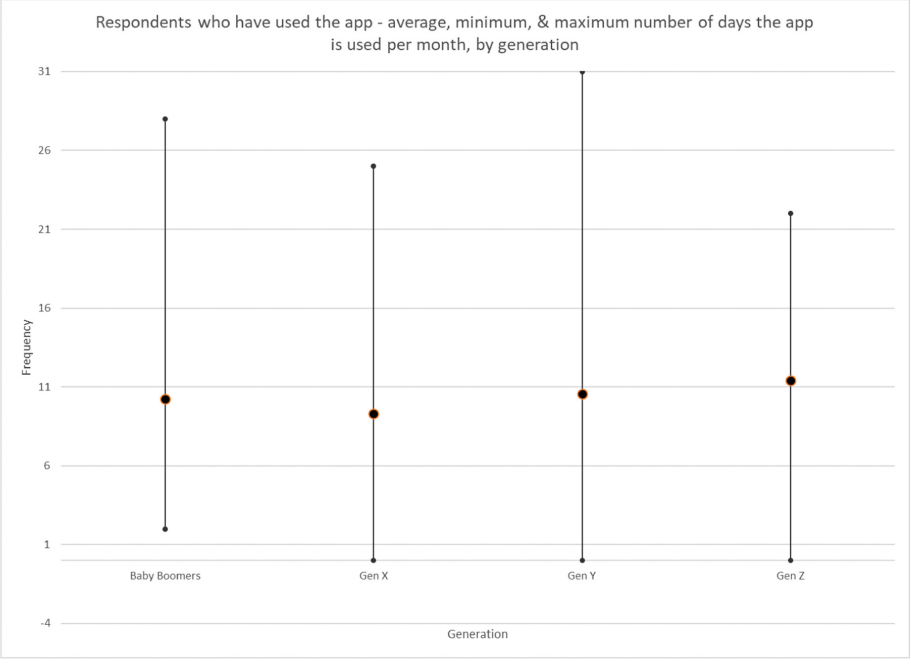

Fig. 5. Question 3a: Respondents who have used the app - average, minimum, & maximum number of days the app is used per month, by generation

Respondents were asked to rate their level of agreement on a scale from [1–7] (strongly disagree - strongly agree) with each of 7 statements. A higher level of agreement with each statement is indicative of a higher level of engagement. Gen X, Gen Y, and Gen Z all seem to have very similar trends among their responses to the statements. Baby Boomers, however, indicated a noticeably stronger level of agreement to all 7 statements, indicating a higher level of engagement (Fig. 6).

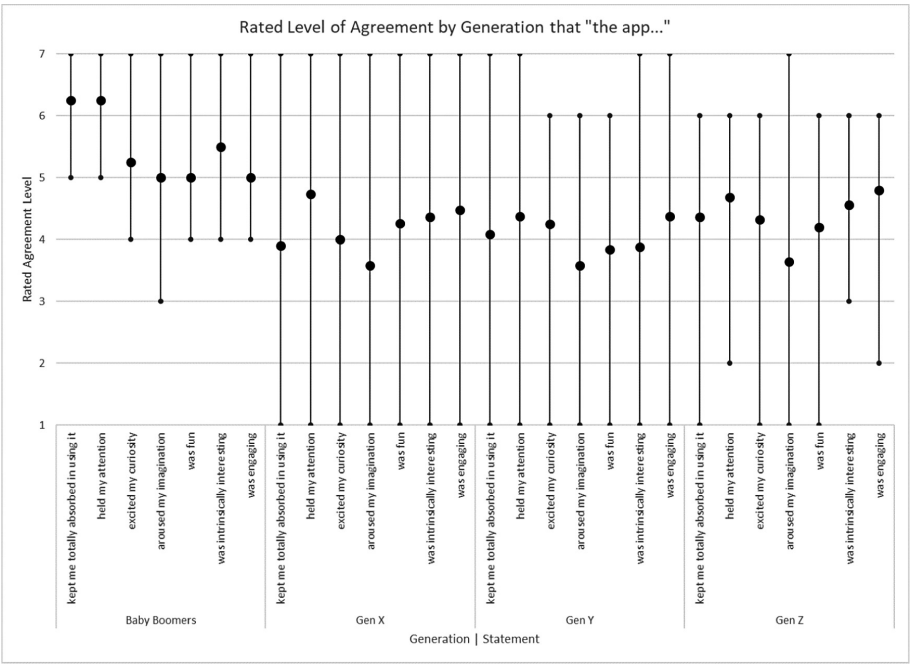

Fig. 6. Question 4a: Rated level of agreement by generation with statements that "the app…"

Respondents who have used the app most frequently used features such as DD Perks & Offers, mobile ordering, and payment. In Gen X and Gen Y, more respondents use payment than mobile ordering. However, in Gen Z, more respondents use the mobile ordering feature than payment. There were 0 Baby Boomers who responded that they use the payment feature, but some of them do use mobile ordering (Fig. 7).

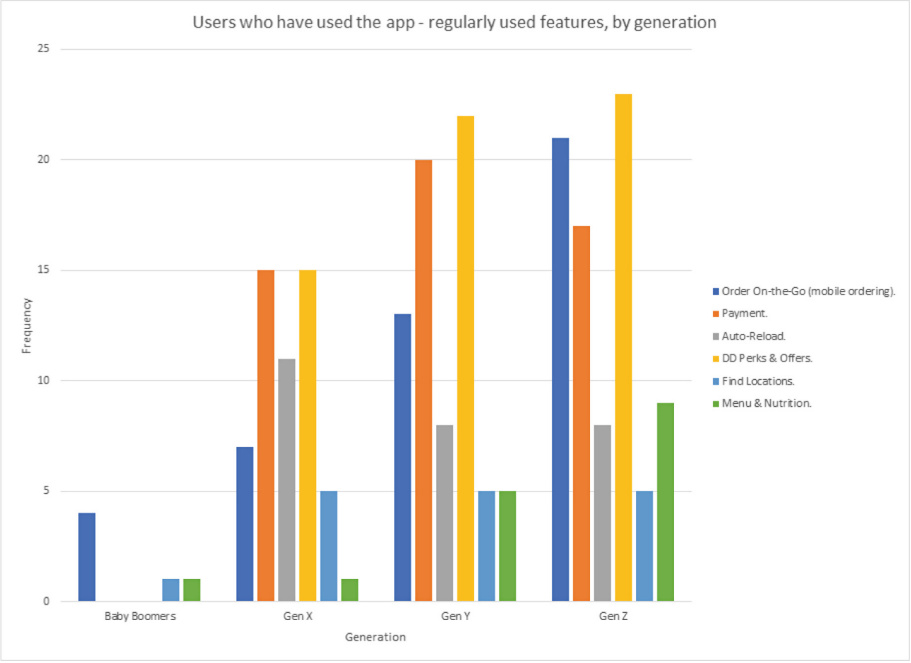

Fig. 7. Question 5a: Users who have used the app - regularly used features, by generation

3.3 Users Who Have not Used the App

Of respondents who have not used the app, many either did not use it because they prefer face-to-face interaction, or they did not know it was available. There was a high response in Gen Z of subjects who did not know that the app was available, and there was a high response in Baby Boomers of those who prefer face-to-face interaction (Fig. 8).

The other option as a fill in was popular among all four generations. Many of the other answers can be summarized using other choices provided as options, however some additional insights provided through the other option include:

- Students on a meal plan using their provided meal plan dollars.
- Not going to the restaurant (enough) or making their own at home.
- Not "getting around to it", with many intending to but not doing so.

Of the respondents who have not used the app, in all four generations there was a high response indicating that they would like to use features such as mobile ordering and DD Perks & Offers. In Gen Z, Gen X, and Baby Boomers, there was a particularly strong response in respondents who would like to use the feature "Find locations." All four generations had a very low response in respondents who would be interested in using the "Auto-Reload" feature (Fig. 9).

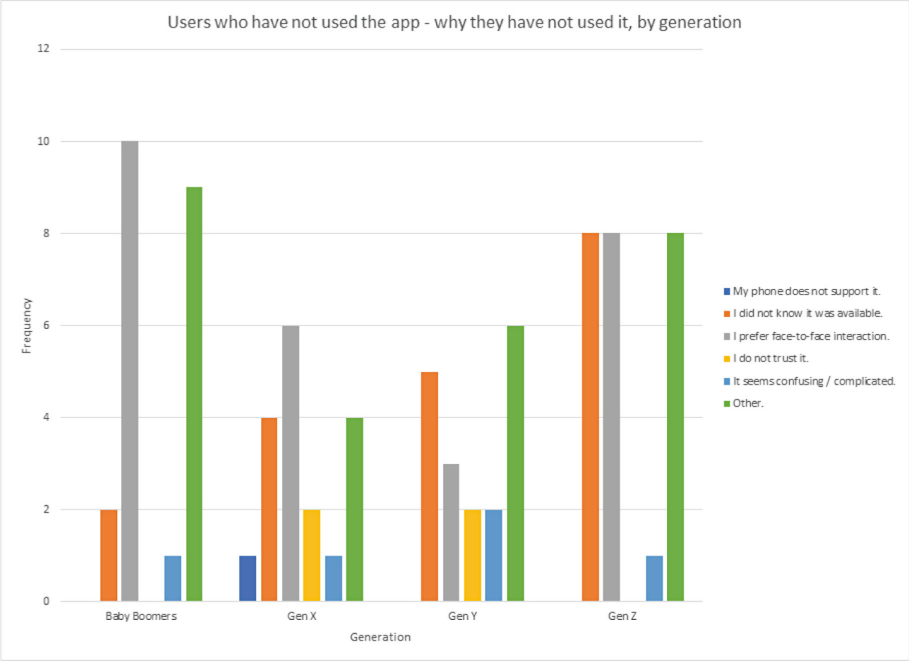

Fig. 8. Question 2b: Users who have not used the app - why they have not used it, by generation

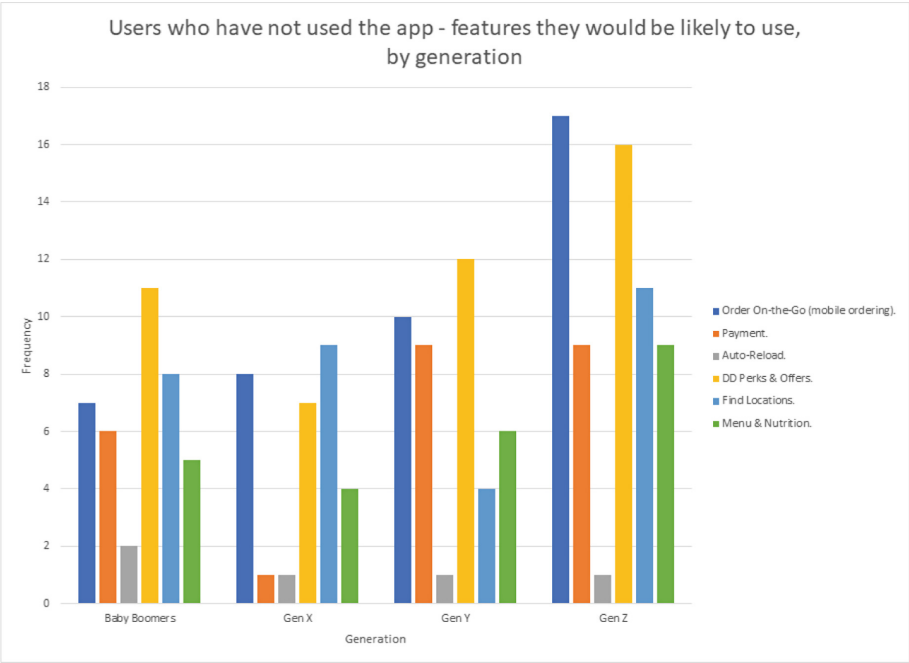

Fig. 9. Question 3b: Users who have not used the app - features they would be likely to use, by generation

3.4 Users Who Displayed Interest in Mobile Ordering

Of the respondents who displayed an interest in mobile ordering, all four generations' highest ranked features in terms of importance were the ability to skip the line and the ability order in advance. Baby Boomers indicated that the least important feature to them was being able to store payment in the app. Gen X, Gen Y, and Gen Z indicated that the least important features to them in the app include saving favorite orders and browsing the menu (Fig. 10).

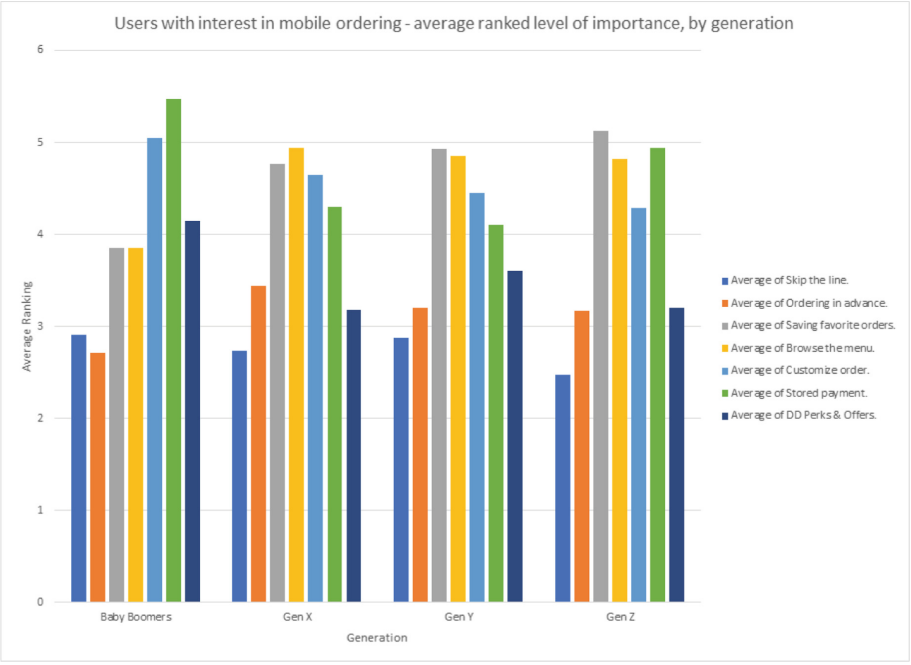

Fig. 10. Question 6: Users with interest in mobile ordering - average ranked level of importance, by generation (lower is better).

3.5 Demographics

Of the demographic questions, the age question was used for sorting subjects, and the affiliation was used only for quality control. However, the results of the device question indicate a trend toward app-users being predominantly iPhone users, while among those who had not used the app, there was more diversity in phone choice (Fig. 11).

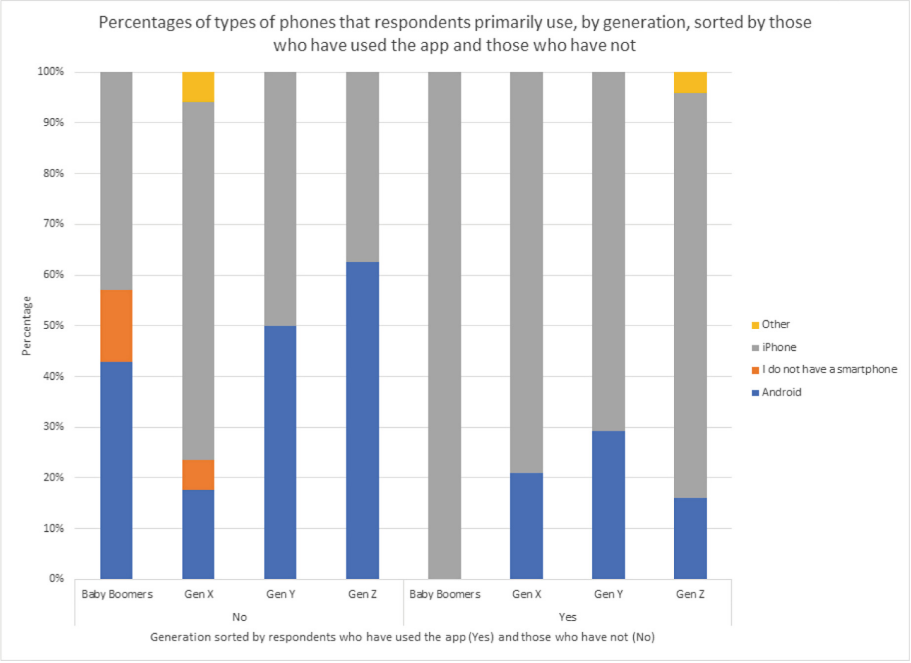

Fig. 11. Question 10: Percentages of types of phones that respondents primarily use, by generation, sorted by those who have used the app and those who have not

3.6 Additional Feedback

The open response field for additional feedback was used by about one third of respondents. Data was cleaned to remove: (a) short responses such as "No", (b) non-sense responses (c) feedback about the survey rather than the app.

After cleaning, the data was then coded to capture the main sentiment of the comment and to group similar comments upon subject. Comment breakdown followed these key topics:

- **Like**: These users like the app and were sharing their happiness with its features, convenience, etc.
- **Dislike**: These users had bad experiences or were not in favor of the app.
- **Buggy**: A subset of dislike, these comments shared experiences with the app not working as expected, or with bugs they had encounters.
- **Trust**: There were many comments about a fear of using the app, or trusting financial data within the app.
- **Face to Face**: These users commented about the workers of the coffee shop, and about wanting to see them, make sure they got tips, or worried for them.
- **No Need**: Several users commented that there just isn't a need for this app, because they have great experiences regularly at the coffee shop.

4 Conclusion

In looking for a significant generational difference in the adoption and engagement for the use of a coffee shop's mobile app, there does appear to be increased adoption among younger generations. A key finding of this questionnaire is that usage of the coffee shop's mobile app aligns well with the general adoption and prevalence of mobile devices, with the youngest generation having the most favorable reaction, and the baby boomers not using the application as often.

In attempting to assess which factor(s) contributed to this generational gap a repeated theme arose across all questions. Technology should serve to enhance or offer new value where it can, perks and rewards, coupons, easy payment, and benefits such as line skipping all do incentivize usage among app users. Not all rewards hold the same sway, while some features like line-skipping may be beneficial to some, to others they remove another benefit, such as social interaction, or the intimacy of a face-to-face interaction with the workers. Among the baby boomers this last point was especially pertinent with much of the enjoyment of their trip to get coffee being in the experience itself. There is a perceived benefit to interacting with the workers, but also a trust in them that to many, an app cannot replace. Older generations were less ready to trust their financial information with the app, while younger generations were much more willing to use the app and its many features.

Among those who were interested in mobile ordering, features were ranked fairly similarly, with features like advanced ordering, line skipping and perks ranking highly. Across all generations the idea of bonuses, coupons and free rewards was nearly universally noted as a good thing. Boomers were consistent with their trust related rankings in that they consistently ranked stored payment as their least wanted feature. A feature that many called out in their open response fields and other boxes was their love of customization. The application allows users to feel confident in customizing their orders and getting exactly what they want. At the same time, users did note that sometimes the customization feature was restrictive, and forced them to order food within a certain construct or limitations, that they can bypass with a human, but the app doesn't allow.

Surprisingly, the Baby boomer generation provided higher average engagement as compared to the other cohorts. This increase in engagement among older populations, is similar to the generational difference in Loos study on use of new media [16, 18]. This may have the do with the novelty of technology as the older generations experience it [22]. The younger generations have lived a larger portion of their lives absorbed in technology, having more time to become accustomed to mobile applications [11, 12]. Because these generations are more used to mobile applications in their everyday lives, the same novelty of experience is not there as it is in the older generations [23–25]. For this study, these factors may have contributed to lower engagement among younger generations.

Across all users it is important for companies to build trust among their users. A mobile application can provide an enriched service experience and even offer users the potential to interact in new ways. However, this experience can't come at the expense of the customer. Part of building out a mobile platform is to extend the

company's existing trust and reputation with users into a new environment, and allow for increased engagement. This means having a consistent, secure, and valuable experience.

While this sentiment works for all users, it is especially important when onboarding new users from aging populations. The results of this questionnaire show that while older users found the app engaging, they did not trust the app as their younger counterparts. Trust with boomers is difficult to obtain, and if a company wishes to seek engagement through new channels, they need to make sure that the application gains their trust. While there may be "an app for that" it is important to consider who is actually using those applications, and how an applications design and implementation could affect long-term adoption.

5 Limitations

For the purposes of this study it is important to note the impact that some of our choices have had to potentially inform the results of this research. The most influential factors in that could change these results would be around our sample size and demographics, and for the specific application we chose to study adoption within.

Demographically we focused on generation as a function of age, however our sample was selected entirely from the community of a university within the United States. The impact of this choice means that our results with a sample size of n = 150, all respondents were faculty, staff, students, or alumni of the university. This means that the responses were likely skewed toward the university population more-so than representing a broader, random, sample. The results for a larger sample size selected from the general population could vary.

The second important factor is in choosing a coffee shop for this study. While a large subset of the university community takes advantage of the on-campus coffee shop, not all people buy coffee or meals from this location. If the study had been run focusing on a different type of application the results might have been varied.

In examining the university population, the potential for an intersectional sample was available. The university accepts students globally, and hires positions across many vocations from tradespeople to professionals, to executives, which meant that there would likely be a diversity of responses. The most readily available, consistently utilized on-campus location, with a mobile app was the coffee shop.

6 Future Work

The distribution of this questionnaire is the first step toward addressing the issue of lower adoption among aging populations. The questionnaire has helped to identify that there is a trust-deficit among older app users that needs to be addressed. Users across all generations expressed interest in accessing some of the features and benefits of the application, future work should help identify how we can personalize a service experience within an application to appeal to multiple generations, while instilling trust, but also maintaining a hospitable human-factor in interaction.

In addition to personalization and increased generational accessibility, future work will investigate the application of social presence theory in order to add more intimate, personal, warm and sensible interactions to the application [26–28]. Through the application of human-like agents for ordering, or the use of avatars as an analog for face-to-face interaction, or even telepresence capabilities we can investigate if these human-like factors increase adoption and trust among users, particularly older users who seemed to place a great value on social interaction as part of service experience.

Additional work can investigate the engagement, and trust differences between personal devices and on-site kiosks, to see if the issue is with the application experience or the overall technology augmentation to the traditional service experience. It will be important to establish if the disconnect within generational adoption is due to the specific implementation, or if the adverse trust-relationship is resultant from technology as a whole.

Finally, to address some of the limitations of this study, future work should examine larger and more varied populations, and explore if these results hold true across different verticals for technology adoption. Future studies should endeavor to discover if the type of cuisine impacts results, and if a wider sample modifies the outcome.

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