**1. Introduction**

The purpose of this document is to analyze customers’ reviews of Kindle app from Apple App Store (US) and Google Play Store (English, not US) for the past 1 year (5/1/18~5/30/19). In total, there were 18,632 reviews (with ratings) at average rating of 4.5 for iOS, and 21,048 reviews (with ratings) at average rating of 3.8 for Android.

* Note that “Review” is different from “Rating”, as in “Rating” is stars (1~5) given by a customer without comments, whereas “Review” requires a customer to enter in their text feedback about the respective app in each platform (iOS or Android), and they tend to have much lower average number of stars given than the average stars given in “Rating”, partly the reason being is more of ‘negative’ perceptions drive more motivation for customers to go out of their ways and leave a review than satisfied customers.

While overall store-facing ratings from App Store rating (4.8) and Play Store rating (4.2) have been fairly stable for some time now, mostly due to the large number of past ratings given, if we were to focus on the newly posted reviews for the past 1 year, average ratings(with reviews) have decreased ~14% (3 months rolling average) from 5/1/18 (4.63) to 5/30/19 (3.99).

This decreasing trend is problematic because of the following reasons:

1. To some extent, we can generalize the feedback given by reviews as reflections of how rest of iOS and Android users are feeling about Kindle apps
2. Reviews’ ratings, while they do not seem to be showing much meaningful correlation with overall reading engagement metrics for the respective surfaces, they do seem to have moderately strong correlation with New to Kindle customers’ reading engagement metrics

|  |  |
| --- | --- |
| **Var 1 & Var 2** | **Correlation Score (Pearson's)** |
| iOS weekly rating & number of unique NTK customers reading | 0.14 |
| iOS weekly rating & number of NTK customers reading | 0.24 |
| Android weekly rating & number of unique NTK customers reading | 0.12 |
| Android weekly rating & number of NTK customers reading | 0.12 |

**2. Methods**

App Annie provides easy-to-use interface where app review data for Kindle-for-iOS and Kindle-for-Android can be downloaded at daily level, containing ratings (1~5) and texts of customer reviews.

Using review text data, removed commonly occurring stop-words such as (I, me, on, is, being, etc.), and created filtered lists of words as well as normalizing different variations of same words, for example grouping words like “crash”, “crashes”, “crashing”, “crashed” into “crash”. Some of the most frequently used words from each platform were the followings:

* iOS
  + “Library”: 1,948 times, “purchase/buy”: 1,699 times, “download”: 1,198 times, “sync”: 863 times, “font”: 644 times
* Android
  + “Download”: 1,331 times, “library”: 430 times, “crash/bug/glitch”: 425 times, “fix”: 410 times, “uninstall”: 194 times

Also have manually gone through most frequently occurring words and created a list of key words that are closely related to different Kindle features or customer experiences to specifically trying to understand sentiment shifts along these key Kindle terms.

* The entire list of Kindle key-words can be found in Appendix 2.1

**3. General Demographic Makeup**

Before diving into broader analysis, here are the basic findings about Kindle customers. For a detailed breakdown of these traits, read side-by-side with appendices A, B and C.

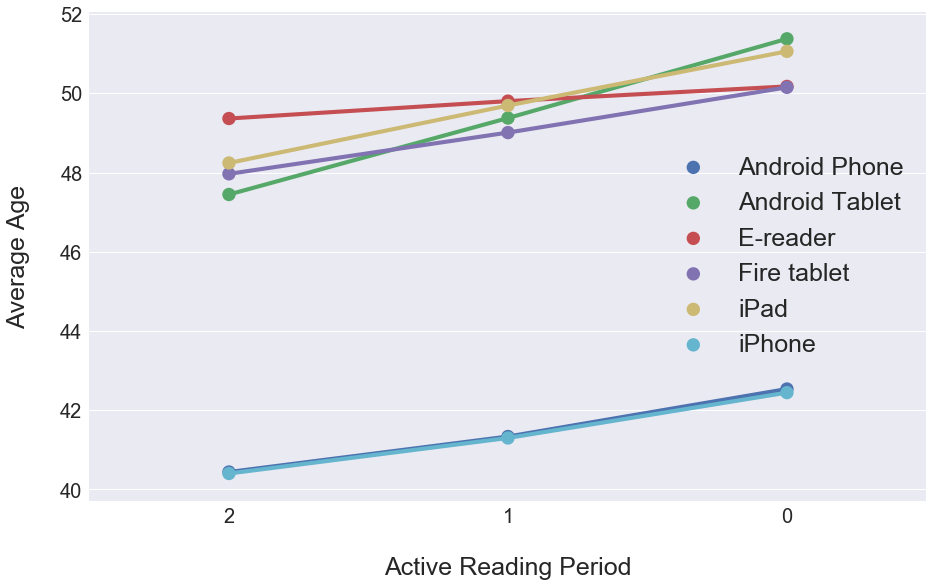
* **Age**: According to credit bureau data, 45% of Kindle customers are over 50. This is consistent with Amazon retail (46% are over age 50), and slightly lower than the 50% of the U.S. population that are older than 50. However, it is significantly higher than the overall population of digital readers. A Pew Research study showed that just 35% of people over age 50 reported reading an e-book in the past year.[[1]](#footnote-2)
* **Gender**: Customers with reading activity in the past year trend heavily female – 61% female, in fact. This is higher than Amazon at large – women comprise 54% of Amazon retail customers – but directionally consistent with readership among the general population. According to Pew, women are more likely to read both print and e-books books than men. 75% of women stated they read a book in the past 12 months (27% read an e-book), as compared to 73% of men (24% read an e-book).[[2]](#footnote-3) However, according to App Annie, Kindle over-indexes on female customers as compared to reading apps like iBooks (47% female) and Play Books (47% female), and even Audible (51% female on iOS, 44% on Android).[[3]](#footnote-4)
* **Household Income:** Kindle over-indexes slightly on high income populations and under-indexes heavily on lower income populations. According to credit bureau data, 33% of active Kindle customers have a household income greater than $100,000 per year, as compared to 28% of the overall U.S. population and 23% of Amazon retail customers. 31% of active Kindle customers have a household income under $50,000 per year, as compared to 43% of the national population and 41% of Amazon retail customers.
* **Education:** Similar to household income, Kindle over-indexes on highly educated customers, and under-indexes on customers with less education. 72% of Kindle customers have some college education or more, higher than the 63% of the general population with the same education level. And while the highest education level for 37% of the U.S. population is a high school diploma, just 28% of Kindle customers are educated at a similar level.
* **Children in Home:** 28% of active readers have children in the home; 72% of active readers do not. This is relatively similar to Amazon at large, where 33% of customers have children in the home, but significantly below the general population average at 38% of households.
* **Race/Ethnicity:** According to Omnibus data, 86% of total Kindle readers are White, 8% are Hispanic, 6% are Black, and 3% are Asian. This maps closely to the overall population of digital readers (85% White), but over-indexes as compared to the U.S. population as a whole, in which 77% of the U.S. population identifies as White. In contrast, Kindle has relatively fewer Hispanic (8%), Black (6%) and Asian (3%) customers than the U.S. population would suggest (18% Hispanic, 13% Black, 6% Asian).[[4]](#footnote-5) At least part of this is likely due to reading population size – according to the Pew Research Center, 27% of White adults, 23% of Black adults and 19% of Hispanic adults have read an e-book in the past 12 months.[[5]](#footnote-6) Since Blacks and Hispanics comprise a smaller overall percentage of the U.S. population, there are fewer potential customers to reach on Kindle. But it’s also a company-wide challenge – Amazon retail is 9% Black and 12% Hispanic, an area that has been identified by that team as a gap to be addressed.[[6]](#footnote-7) And Kindle trends even less diverse than Amazon retail.

**4. Demographic Change Over Time**

Current customer demographics are valuable to examine, but it’s also important to look at how they are changing over time. To measure this, we compared demographic data for customers who were active in the past year (2017-2018) against two similar cohorts from the years before (2015-2016 and 2016-2017), then looked specifically at NTK customers to compare new versus existing customers.[[7]](#footnote-8)

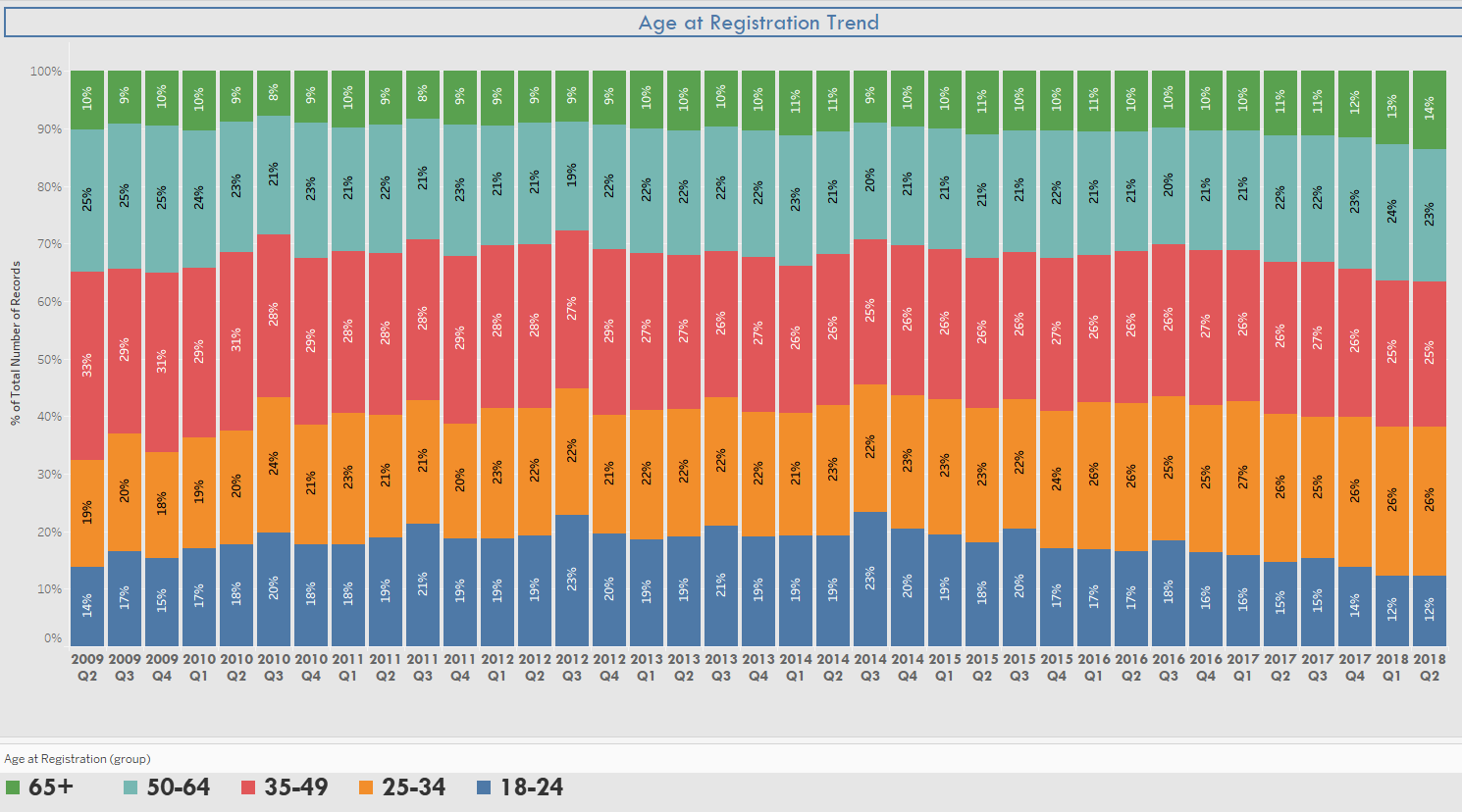
For this, since we do not have a historical snapshot of customer attributes for previous years, we were only able to look at values for which we were able to infer historical records – age since it has a constant rate of change, and gender since it is less likely to change on a broad scale. We were not able to measure changes in other demographic attributes like household income, education, or children because those values change inconsistently over time. If we are interested in diving deeper on those attributes, we can begin tracking now to analyze further in the future.

* **Average age trending up slightly over time:** Kindle readers as a whole trend older than both Amazon retail and the digital reading population as a whole, and have been getting older for the past 3 years in a row. The increase in average age is slightly apparent at the overall level (the average age of active readers from the oldest cohort was 46 years old, and it has since increased to 47.6), without much change in standard deviation, inferring an entire rightward shift.
  + To better understand this shift, we looked at whether the average age changed significantly by primary device used, and saw that the average age is trending up on every major device, although it’s trending up slowest on E-readers (35% of active reading). The average age of customers who read on E-reader is on average 0.8 years older now than they it was in 2015 (from 49.4 years old in 2015 to 50.2 in 2018). In comparison, the average age of iPhone/Android users rose 2 years, and the average age of iPad readers increased 2.8 years (from 48.2 to 51) in the same timeframe.

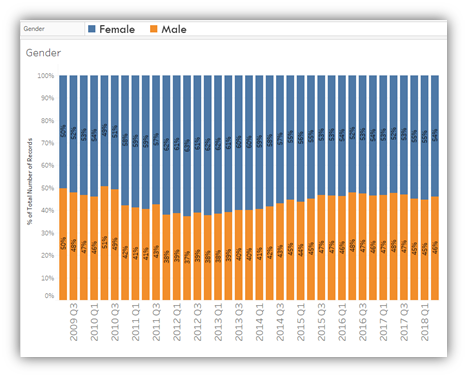
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*P0 Cohort: 2017-2018 customers, P1 Cohort: 2016-2017 customers, P2 Cohort: 2015-2016 customers*

* **Smaller share of younger customers coming in:** As evidenced by the graph below, the average age of NTK customers trended slightly younger from 2009 to 2016 – from 48 years old in 2009 to 42 in 2016. However, since then it has trended back up (to 43 in 2017), driven both by a larger share of older customers signing up, and fewer young customers doing so. Very young users (18-24) represented about 15% of total monthly NTKs in 2009, which had increased to ~20% by late 2015. However, that group started dropping in early 2016 and was just 12% in the most recent quarter (Q2 2018). This is not just a percentage drop – the absolute number of 18-24 NTK customers is dropping as well. From 2012 to 2015, Kindle was acquiring 800 users per month on average who were 18-24, but from 2016 onward, Kindle has averaged just 560 new users aged 18-24 per month, despite the overall number of NTKs increasing 10% during the same timeframe.
  + Interestingly, we see average age dip (trend younger) every year around August, September, and January. Our hypothesis was that this spike was driven by students signing up to prepare for the new semester of school. We validated this by looking at the primary genre of books those new customers consumed, and noticed they were far more likely to consume textbooks (78% more likely) and comics/graphic novels (38% more likely) than the general NTK population, and less likely to consume other genres like romance (18% less likely).

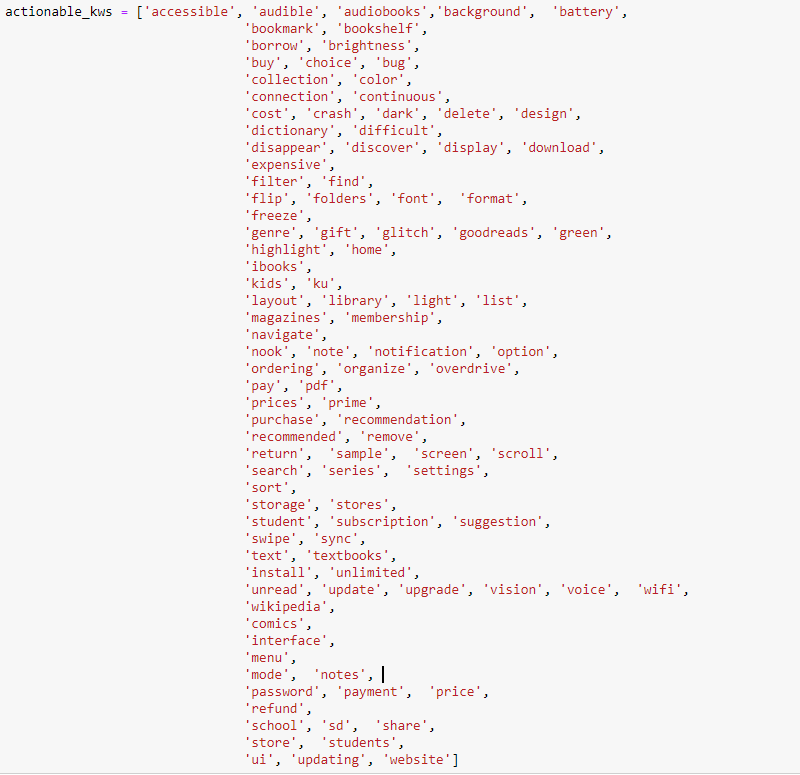


* **Fewer new women joining:** The majority of active readers are women, and the representation stayed relatively constant over the last few years. Women comprised 62% of active readers in 2015, and comprise 61% in the current year. New customers have also stayed similarly constant – while there was a period in 2012 where women comprised 60%+ of new sign-ups, it has held steady at 55% over the past 3 or so years. Given the gap between customer sign-up rates by gender and the overall gender split, we can infer that women tend to be more engaged and stick around longer than men do.



**Appendix**

Appendix 2.1:



1. http://www.pewresearch.org/fact-tank/2018/03/08/nearly-one-in-five-americans-now-listen-to-audiobooks/ [↑](#footnote-ref-2)
2. http://www.pewresearch.org/fact-tank/2018/03/08/nearly-one-in-five-americans-now-listen-to-audiobooks/ [↑](#footnote-ref-3)
3. See appendix B for detailed breakdown of gender breakdown across apps from App Annie. [↑](#footnote-ref-4)
4. Kindle Content Readers by US Race/Ethnicity, 2018 [↑](#footnote-ref-5)
5. http://www.pewresearch.org/fact-tank/2018/03/08/nearly-one-in-five-americans-now-listen-to-audiobooks/ [↑](#footnote-ref-6)
6. Millennials Diversity Barriers Exploratory Research, Oct. 2017 [↑](#footnote-ref-7)
7. Customers who were active in multiple periods are counted in each. [↑](#footnote-ref-8)