Exploring mobile app stickiness using technology acceptance model (TAM), a gender perspective

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Keywords: Mobile App Stickiness, Gender, Consumer, TAM

Mobile retailing is exploding with 72.9 percent of all retail e-commerce being generated by mobile commerce and the volume is expected to rise at a 25.5% compounded annual growth rate (CAGR) and hit $488.0 billion, or 44% of e-commerce, in 2024 (Copola, 2020; Meola, 2020). Mobile commerce, or "m-commerce" includes any monetary transaction completed using a mobile device, mostly using an app. While mobile app usage has increased to 90% and 66% of mobile transactions occurring within an app (Mobile App, n.d.; Swanner, 2018), app uninstall rate is still quite high, close to 36% (Koetsier, 2020). Hence, it is critical to examine the factors that could potentially impact the adoption of mobile app, i.e. mobile app stickiness, especially since the average app can potentially lose about $57,000 a month due to uninstalls (The Uninstall Threat, n.d.). Finally, as women spend more time on mobile devices for app/web usage than their male counterparts, it is important to pay attention to gender differences in mobile app usage (Media Melting Pot, 2019). Thus, the purpose of this study is examine gender differences with respect to (1) influence of app features (social integration (SI), design aesthetics (DA), interactivity, and risk) on perceived usefulness (PU) and perceived ease of use (PEOU); (2) influence of PU and PEOU on attitude towards the mobile app; (3) impact of attitude on mobile stickiness.

Rationale & Significance: Mobile app stickiness is related to mobile app adoption with "stickiness" referring to an app's ability to be adopted and continually used (Hsu & Tang, 2020). Gender is a critical issue when it comes to mobile app usage and adoption, especially since industry data indicates women and men are different in their usage of mobile devices as well as time spent on retail sites and apps (Delisle, 2019; Media Melting Pot 2019). Previous research that has examined gender and mobile usage include moderating effect of gender on consumer engagement, value co-creation, and continuous use intention (Lim, et. al., 2021); gender difference in mobile website design (Tupikovskaja-Omovie, & Tyler, 2020); and association between gender and education level and branded mobile app usage intentions (Ncube, & Koloba, 2020). However, none of the previous studies have examined the gender differences with respect to app features and its' eventual impact on attitude and mobile app stickiness. Therefore, it is important for the current study to examine the influence of the app features (SI, DA, interactivity, and risk) on PEOU, PU and its' eventual impact on attitude and mobile app stickiness. Social integration refers to an app's ability to make a consumer feel immersed in the experience of using an app by connecting them to other users. Design aesthetics refers to visual cues and imagery within an app. Risk examines consumers' perception of security and privacy related to an app. Finally, interactivity encompasses features such as augmented or virtual reality, to name a few, on an app. The conceptual model for the current study has been adapted from

TAM. TAM has been successfully used to understand consumer's adoption of technology including attitudes towards mobile technology use (Rivera et al., 2015), hence is appropriate for the current study (see Figure 1).

Methods. Data was collected using an online survey (n = 312), which consisted of demographic questions and reliable scales (Nunnally, 1978). Qualtrics Research Services was used to collect the data and included consumers in the US. The population that was selected for the survey included U.S. consumers who had previous experience using either Wal Mart or Amazon's mobile app as these two apps are leading shopping app based on downloads (Statista Research Department, 2023). Scales and items were adapted from several previous studies to allow measurement of the mobile app features, technology attributes, and attitude on mobile app stickiness. All items were measured on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Results. Data for this study was collected using a survey research company and resulted in a sample of n = 312. The data was split between male (n = 158) and female (n = 153) and most respondents preferring mobile apps (66.75%). For the preliminary analysis, a principal component factor analysis with varimax rotation was performed. The factor loadings were above 0.50, and alpha coefficients ranged from .84 to .91. A measurement model was tested through structural equation modeling (SEM) using AMOS. The measurement model indicated good fit ($\chi 2$ = 588.92; df = 378; p = 0.000; CFI = 0.96; RMSEA = 0.057; RMR = 0.048) (see Kline, 2005). Each of the latent variables satisfied the suggested criteria for composite reliability and average variance extracted (Nunnally & Bernstein, 1994). The hypothesized relationships were tested through SEM. The structural model revealed adequate fit ($\chi 2$ = 1847.906, df = 906, p = 0.000; RMSEA = 0.04; CFI = 0.93; RMR = 0.059). Multi-group analysis was used to examine gender differences and based on parameter estimate t-values cutoffs of 2.00 (Byrne, 1998), the following hypotheses were supported (please see Table 1).

Figure 1. *Research Model*
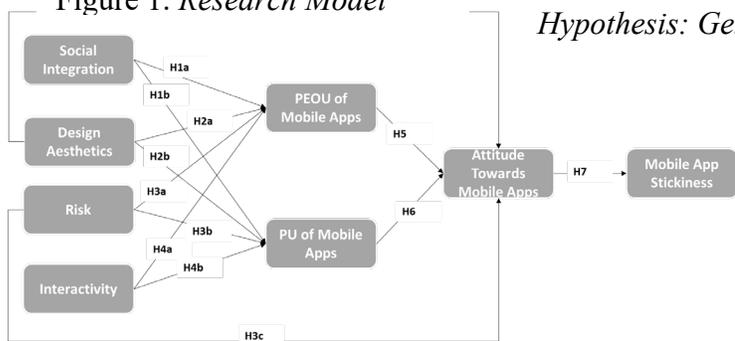
Table 1: *Research Hypothesis: Gender*

Hypotheses		Male	Female
Social Integration → PEOU	H_{1a}	Supported**	Not Supported
Social Integration → PU	H_{1b}	Not Supported	Not Supported
Design Aesthetics → PEOU	H_{2a}	Not Supported	Supported**
Design Aesthetics → PU	H_{2b}	Not Supported	Supported**
Design Aesthetics → Attitude	H_{2c}	Supported***	Supported*
Risk → PEOU	H_{3a}	Not Supported	Not Supported
Risk → PU	H_{3b}	Supported*	Not Supported
Risk → Attitude	H_{3c}	Not Supported	Supported***
Interactivity → PEOU	H_{4a}	Supported***	Supported***
Interactivity → PU	H_{4b}	Supported**	Supported***
PEOU → Attitude	H_5	Not Supported	Not Supported
PU → Attitude	H_6	Supported*	Supported***
Attitude → Mobile App Stickiness	H_7	Supported***	Supported***

Conclusions: Mobile app stickiness is a critical "performance indicator" and is a measure of how an app keeps users actively engaged on an ongoing, frequent basis (Kloot, 2019). The current study used the TAM framework and adapted it to measure the impact of SI, DA, risks, and interactivity on PEOU and PU. Furthermore, the research also investigated the influence of DA

& risk on attitude, PEOU & PU's influence on attitude, and the impact of attitude on mobile app stickiness. The results indicated for both genders, SI did not impact PU, risk did not influence PEOU, and PEOU did not impact attitude. It can be inferred that the usefulness of an app is not detrimental to feeling connected to the "app community". Additionally, based on the results it can be stated that ease of using an app is not associated with risk. Similarly, PEOU did not impact attitude, this could be attributed to the fact that most users are comfortable using apps. An important finding of this study was the impact of DA for females with respect to PU & PEOU. It can be inferred that brands and app developers need to pay attention to *User Interface* characteristics. However, the study did find influence of DA on attitude for both genders, with the relationship being stronger for men, supporting the impact of DA on the overall *User Experience*. It can be suggested that while men may not pay attention to DA while deciding if the app is easy to use or useful, they will take DA into account while making the decision whether they like the app. Interactivity influenced PU & PEOU for both genders. This finding supports the inclusion of interactive features in an app as it is a great tool for engagement and can potentially reduce app abandonment. The study finds support for attitude and mobile app stickiness for both genders.

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