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Drivers of continuance intention with mobile banking apps

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Abstract

Purpose – The purpose of this paper is to examine the drivers of continuance intention with mobile banking apps, in a Thai context. The secondary objective is to examine if there are underlying segments that differ meaningfully in this regard.

Design/methodology/approach – A structural equation model based on the European Customer Satisfaction Index is estimated. The data were obtained by conducting an online survey of mobile banking users in Thailand ($n = 399$).

Findings – The top 3 factors directly affecting continuance intention toward mobile banking are satisfaction, trust and expectancy confirmation. Image and perceived risk also have an impact, although studies have reported that the latter is less impactful than the prior. One latent segment is more influenced by observable performance characteristics like confirmation and perceived quality, the other more by credence factors like trust and image.

Practical implications – The study confirms the important role of satisfaction and expectancy confirmation in driving continuance. Somewhat unexpected is the high relative prominence of trust as a driver, at least in the Thai context. This is a "soft" variable managers should not dismiss. The identification of segments also points to potentially different treatment and actionable advice for managers.

Originality/value – This paper adds to the scant body of empirical work on continuance intention with mobile banking. In light of the large investments in mobile banking capabilities being made, this is an under-researched area. This paper to the authors' knowledge is the first to study consumer heterogeneity in this context.

Keywords Satisfaction, Loyalty, Thailand, Mobile banking, Continuance, ECSI

Paper type Research paper

1. Industry background and study motivation

Mobile banking has emerged as a key channel in recent years. While some of the initial industry push toward mobile banking was motivated by the desire to cut cost, there were other, more important reasons. According to a survey of American bank managers conducted in 2011, when mobile banking was nascent, the top motivators for banks to invest in mobile banking platforms were "deepening customer relationships" (87 percent), "competitive pressure" (71 percent), "moving transactions to lower-cost channels" (55 percent) and "new relationship acquisition" (53 percent) (Crosman, 2012). According to a recent analysis of 67,000 banking customer records in the USA, mobile banking apps are indeed successful at making customers use a wider range of services, more frequently (Freier, 2016). The same study reports a 4.9 percent attrition rate among mobile banking customers, compared to 13.9 percent for those who are not enrolled.

A related trend is the closures of bank branches around the world. A recent newspaper article provides details of Thai banks' plans to invest in digital platforms and close branches

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(*Bangkok Post*, 2018). For instance, Siam Commercial Bank, Thailand's largest bank, announced plans last year to invest the equivalent of $1.2bn to enhance its digital banking platform. The same bank has plans to reduce its number of branches to 400 in 2020, from 1,153 at the time of writing. The move from branch banking to digital customer touchpoints signifies a drastic overhaul in the way customer relationships are managed. This necessitates a detailed understanding of customers' perceptions and attitudes toward these new touchpoints.

The objective of this study is to examine the drivers of customers' continuance intention with mobile banking, including how those might vary by segment. While a significant number of studies have looked at the adoption decision, there is scant research on the drivers of continuance, a discrepancy also noted by other authors (e.g. Bhattacherjee, 2001b; Yuan *et al.*, 2016). While there is likely to be an overlap between the drivers of adoption and continuance, they are not necessarily the same. For instance, initial apprehensions about risk may fade with the passing of time, and the perceived value of an app may increase with experience.

As there are very few published studies on this topic to date, we take an exploratory, empirical approach. The European Customer Satisfaction Index (ECSI) model, with some relevant extensions, provides the core framework for this study. We collected a sample of 399 Thai mobile banking users, for which we will present aggregate and segment-level results.

2. Country background

Thailand is a relative newcomer to mobile banking, but adoption in recent years has been fast, going from roughly 1m installed apps in 2013 to more than 25m in 2017 (The Asian Banker, 2017). Compound annual growth in the number of transactions from launch in 2010 to October 2017 was 22 percent (Bank of Thailand, 2017). The adoption rate of mobile banking according to a global survey conducted at the end of 2018 is 74 percent, well ahead of the global average of 41 percent, higher than China (61 percent) and comparable to Sweden (71 percent) (Iwamoto, 2019). Banks are in the process of enhancing their digital banking capabilities, while continuing to scale down their branch networks (*Bangkok Post*, 2018). For instance, several banks have recently upgraded their mobile banking apps to offer a wider range of services, such as one-tap money transfers, foreign currency buying, buying movie tickets and making donations (Masayuki, 2018). Also relevant in this context is the strong government push toward mobile payment systems (Fang, 2019), with pressure directed both toward banks (many under government control) and end users (*Bangkok Post*, 2018).

3. Literature review

There are few studies on continuance intention specific to mobile banking. There is, however, a base of work in the general information technology field that we can draw upon (e.g. Bhattacherjee, 2001a, b; Zhou, 2013; Roca *et al.*, 2006; Thong *et al.*, 2006), as well as a small literature in the context of mobile payments (e.g. Zhou, 2013; Zhao *et al.*, 2012) and internet banking (Ofori *et al.*, 2017). The literature is disjointed in that the different studies mix and match constructs and frameworks to suit a specific research objective. Depending on the authors' focus, they start from frameworks like the Technology Acceptance Model (Yuan *et al.*, 2016), Expectation Confirmation Model (Bhattacherjee, 2001a), Information Systems Success Model (Zhou, 2013) and others. Inconsistent study design notwithstanding, there are some core constructs present in most studies about which we can start to generalize. One finding that stands out is the central role of satisfaction in driving continuance (e.g. Bhattacherjee, 2001a, b; Zhou, 2013; Kumar and Ravindran, 2012). Another is the strong path coefficient for trust on continuance in the papers that include a measure of this construct (e.g. Zhou, 2013; Ofori *et al.*, 2017) or a related one such as relationship quality (Chen, 2012). Papers focusing on financial products usually include a construct of perceived risk. The results for this variable are inconclusive, with for instance Yuan *et al.* (2016)

finding it to be the strongest (negative) driver on continuance among the included variables, but Chen (2012) finding no statistically significant effect. More empirical research is needed to understand this relationship.

We found only three studies on continuance intention with mobile banking services. A study conducted with Chinese users by Yuan *et al.* (2016) combines elements of the Expectancy Confirmation, Technology Acceptance, and Task-Technology Fit models to predict continuance intention. They also test the paths onto continuance intention for moderation by Gender. They find that satisfaction and perceived risk have the strongest total effect (0.237 and 0.323, respectively). Moreover, the impact of perceived risk is stronger in men. No other moderation effects by gender are statistically significant. A second Chinese study by Chen (2012) tests a smaller model with just four antecedent constructs. It finds that relationship quality (related to, but broader than trust) has the strongest impact on continuance, followed by technology readiness and service quality. Surprisingly, perceived risk has no significant impact. A third study conducted in India by Kumar and Ravindran (2012) extends the Technology Acceptance Model, and like the paper by Yuan *et al.* (2016) has direct paths from satisfaction and perceived risk on continuance intention, with combined effects of 0.52 and 0.34 in respective order.

In sum, the wider literature on continuance has given researchers a range of useful frameworks and constructs, but especially in the area of mobile banking (and financial services in general) there is an urgent need for more empirical work to enable future generalizations. This is demonstrated, for instance, by the inconclusive results described above for perceived risk. The literature to date has also ignored heterogeneity among consumers, with the exception of gender (Yuan *et al.*, 2016). The present paper aims to add to address these points.

4. Model and description of constructs

Given the important role of satisfaction in prior results, we base our research design on the ECSI to model its antecedents in a comprehensive and extensively tested framework. We also make some extensions to the core ECSI model, which we will motivate in the following paragraphs.

The ECSI model includes the constructs of customer satisfaction, perceived value, perceived quality, customer expectations, corporate/brand image, customer loyalty and complaints. It has been validated across a wide range of service industries like telecommunications, postal services and retail banking (Chitty *et al.*, 2007). The ECSI is derived mainly from the American version ACSI (introduced in 1994) and its predecessor Swedish Customer Satisfaction Barometer (introduced in 1989). One main difference is the elimination of "customer complaints" as a consequence of satisfaction in the ECSI. The motivation for doing so is that the handling of complaints should be viewed as a driver rather than a consequence of customer satisfaction (Johnson *et al.*, 2001). Johnson *et al.* (2001) also make a methodological point: we can investigate customer satisfaction only after the complaint has been handled; therefore, it contributes to the satisfaction result *ex ante*, i.e. it is a driver. In our model, we incorporate a complaint handling construct and conceptualize it as a driver of satisfaction and continuance intention.

Ball *et al.* (2004) added communication and trust to the ECSI in order to better predict loyalty. continuance intentions capture the conative component of loyalty (the others being affective and cognitive). For the purpose of constructing a conceptual framework, we hypothesize that known antecedents of loyalty in the broad sense also apply to continuance intentions specifically.

We further augment the core ECSI model with perceived risk. Perceived risk is of especially high importance in the context of mobile banking, where sensitive data are processed via mobile networks (Newell and Newell-Lemon, 2001; Kim *et al.*, 2007; Toh *et al.*, 2009). Moreover, as described in the literature review, prior studies in this area found inconsistent results for perceived risk, which points to the need for more empirical work.

As in the study by Yuan *et al.* (2016), we conceptualize perceived risk as having a direct impact on continuance intention, and a mediated one via perceived value and satisfaction.

Corporate image is the overall and general impression formed in consumers' minds about a company. Kristensen *et al.* (2000) mention that corporate image has a significant impact on customer satisfaction and loyalty, which is confirmed in a number of ECSI studies. O'Loughlin and Coenders (2002) and Kristensen *et al.* (2000) also support, in a B2C setting, that corporate image positively affects customer satisfaction and loyalty. Therefore, we propose:

H1a. Corporate image is positively related to satisfaction.

H1b. Corporate image is positively related to continuance intention.

Customers regularly have an expectation of performance prior to experiencing it. Such baseline expectations are based on prior use, contextual cues, word of mouth or other sources. Positive disconfirmation (when perceived performance exceeds expected performance) leads to higher customer satisfaction and loyalty (Patterson *et al.*, 1997). In this study, we adopt a summary construct called expectancy confirmation from Bhattacherjee (2001a, b), or in short, confirmation with its attendant scale items:

H2a. Confirmation is positively related to satisfaction.

H2b. Confirmation is positively related to continuance intention.

Perceived quality refers to customers' evaluation of how well their requirements have been met in reference to expected standards. This evaluation may also include consumers' perception of the reliability of the service delivery process, which is relevant to future use of the service. Prior research shows that perceived quality has a significant positive impact on customer satisfaction and loyalty (Fornell *et al.*, 1996; Parasuraman *et al.*, 1996; Kim *et al.*, 2007). Thus, it is assumed that:

H3a. Perceived quality is positively related to satisfaction.

H3b. Perceived quality is positively related to continuance intention.

The perceived value of a service represents the benefits from the service relative to the costs linked to its usage (Levesque and McDougall, 1996). Several authors point out that perceived value, perceived quality and cost are independent constructs. For instance, Heskett *et al.* (1997) argue that low price does not automatically mean high value. Likewise, Rust and Oliver (1994) argue that high-quality services can still be perceived to be poor value. Zeithaml and Bitner (2000) propose and validate a model whereby satisfaction is driven by perceived value. There is also a large literature linking perceived value to purchase intentions (e.g. Levesque and McDougall, 1996), hence we also assume continuance intentions. We propose:

H4a. Perceived value is positively related to satisfaction.

H4b. Perceived value is positively related to continuance intention.

When judging a firm's communication, "good" means helpful, positive, timely, useful, easy, pleasant and personalized. "Good" service providers should provide "information in such a way that the customer personally benefits with a minimum of effort necessary to decode the communication and determine its utility" (Ball *et al.*, 2004). Evidence that supports the important role of a personalized communication, preferably in a person-to-person format, in obtaining loyalty has been provided by Parasuraman *et al.* (1996), Lemon *et al.* (2001), and Allen and Wilburn (2002). Accordingly, we suggest:

H5a. Communication is positively related to satisfaction.

H5b. Communication is positively related to continuance intention.

Trust is a common antecedent in studies of satisfaction and loyalty (e.g. Schaupp and Bélanger, 2005; Verhagen *et al.*, 2006). Deutsch (1960) defines trust as an "individual's confidence in the intention and capabilities of a relationship partner and the belief that a relationship partner would behave as one hoped." Trust is especially important in online business, which is characterized by low or even zero personal interaction (Chen and He, 2003; Huang *et al.*, 2004). A study by Ranaweera *et al.* (2005) reports a greater impact of trust on loyalty than satisfaction. Hsu (2008) confirmed that trust positively influences continuance intention. We therefore assume that:

H6a. Trust is positively related to satisfaction.

H6b. Trust is positively related to continuance intention.

Perceived risk is defined as a feeling of uncertainty about eventual negative consequences of using a service (Featherman and Pavlou, 2003). Previous technology adoption studies find perceived risk to have an impact on the decision to adopt (Laforet and Li, 2005). Adoption of a new technology will be high(est) if the related risk is considered to be low. Perceived risk influences usage or purchase intention. Lin (2008) found that customers tend to reduce their usage or purchase intention when they feel unsafe about the electronic transfer of credit card or other sensitive information. This is supported by other studies claiming that perceived risk is an important factor in users' adoption of mobile banking (Brown *et al.*, 2003; Luarn and Lin, 2005). Based on the above, we hypothesize:

H7a. Perceived risk has a negative impact on satisfaction.

H7b. Perceived risk has a negative impact on continuance intention.

Complaint handling refers to the way a company addresses complaints, and how this is perceived by the complainer (O'Loughlin and Coenders, 2002). If a firm reacts slowly and inappropriately, customers might suspect opportunistic behavior or simply incompetence (Morgan and Hunt, 1994). Both result in negative effects on credibility and trust (Ganesan, 1994). On the other hand, a well-resolved issue could transform a dissatisfied customer into a satisfied and more loyal one (Smith and Bolton, 1998). This implies:

H8a. Complaint handling has a positive impact on satisfaction.

H8b. Complaint handling has a positive impact on continuance intention.

Satisfaction refers to customers' *ex post* evaluation after the company has rendered its service (Fornell, 1992). It is commonly operationalized using the expectancy disconfirmation paradigm (Oliver and Swan, 1989), where the gap between perceived and expected performance is a key driver. The relationship between loyalty and satisfaction has been extensively researched (Oliver, 1999). As before, we hypothesize that proven antecedents of loyalty in general also apply to continuance intentions (conative loyalty) in particular:

H9. Satisfaction has a positive impact on continuance intention.

This results in the following model.

5. Methodology

The original version of the questionnaire was developed in English and then translated into Thai by two native speakers. The scale items (see Appendix) are adapted from prior work on continuance intention. After a test launch with 30 participants, the questionnaire was administered online. The sampling method was a combination of convenience and judgment sampling. We asked students in an evening Master's in Management program in Bangkok to use their judgment to forward the questionnaire to a demographically representative sample

of likely mobile banking users. In total, 556 questionnaires were distributed of which 403 were returned, and 399 were deemed complete and usable. No further data cleaning or removal of outliers was performed. The demographic distribution of the sample is summarized in Table I.

Some groups appear to be overrepresented in the sample relative to the total Thai population: those aged under 30, women, the highly educated, and the middle income class. We do not have a demographic breakdown of mobile banking users to compare our sample against. With the exception of gender, however, the sample seems to represent the target market rather well. One would expect early adopters of mobile banking to hail disproportionately from the young, affluent and highly educated. A more rigorous argument to allay concerns about the external validity of the data set is needed, however. Later in the paper we report results from demographic subgroup analyses. Looking ahead, we find hardly any differences between subgroups. This means that the aggregate results are not sensitive to sample biases, and that with the usual caveats the findings from this study can be generalized.

6. Data analysis

We use the partial least squares structural procedure in XLSTAT to estimate the structural equations model. PLS-SEM is an increasingly popular method for estimating structural equations models (Henseler *et al.*, 2012; Hair *et al.*, 2012). Compared to covariance-based estimation methods, it is less demanding in terms of sample size, requires no distributional assumptions about the data and has advantages when working with formative indicators. It is especially the former advantage – lower sample size requirements – that motivates our choice, to enable subgroup analyses and explore latent segments in the data. Simulation studies have shown that with sample sizes exceeding 250, the results are very similar to covariance-based estimation methods (Hair *et al.*, 2016).

In the next section, we will first inspect the measurement model to verify that the study constructs are measured appropriately, and then proceed to interpret the structural model

Demographic segment	Frequency (*n*)	Percent
Gender		
Male	129	32.3
Female	270	67.7
Age (years)		
⩽20	17	4.3
21–30	259	64.9
31–40	75	18.8
41–50	23	5.8
⩾50	25	6.3
Education		
Less than high school	4	1.0
High school graduate	16	4.0
Bachelor's degree	246	61.7
Master's degree	130	32.6
PhD	3	0.8
Income (Thai Baht)		
⩽20,000	78	19.5
20,001–40,000	192	48.1
40,001–60,000	61	15.3
60,001–80,000	24	6.0
⩾80,000	44	11.0
Sample size (*n*)	399	100

Note: $N = 399$

Table I.
Sample demographics

results to see which hypotheses are supported. We follow the general steps laid out in Hair *et al.* (2012) and the Hair *et al.* (2016) book on PLS-modeling. For more detailed justification and references, we refer the reader to these sources.

6.1 Measurement model

Before inspecting the structural model, the reliability and validity of the measurements need to be established. For this, we apply the criteria spelled out in Hair *et al.* (2016) for reflective indicators. Reflective indicators are conceptualized to be a manifestation of the relevant latent construct. In other words, the latent construct is the cause and the indicator variables the observable effect. This is in contrast with formative indicators not used in this study, where the causality is reversed and different criteria for evaluating the measurement model apply.

To assess the reliability of the measurements, we report Cronbach's α and composite reliability for each exogenous variable. While Cronbach's α is more commonly used, it tends to underestimate internal consistency reliability. Composite reliability is a more precise measure of internal consistency reliability (Hair *et al.*, 2016) with less restrictive assumptions. Its value is interpreted in a similar way to Cronbach's α. Inspecting the values in Table II, both measures far exceed the commonly cited minimum threshold of 0.7 for each construct, confirming internal consistency reliability. In addition, inspection of the eigenvalues shows the measured constructs to be unidimensional, with indicators for each variable loading predominantly on the first factor.

Moving on to content validity, we use scales adapted and abbreviated from previous studies (see Appendix). The number of items per construct is kept to a minimum (usually 3 or 4) as a compromise between content validity and minimizing respondent error through fatigue and boredom. In total there are 34 items (five-point rating scales) measuring ten constructs, in addition to general questions about demographics and relevant consumer behavior.

Convergent validity captures the notion that alternative measures of a construct should produce similar results. This is operationalized with two criteria: Each indicator must have a loading higher than 0.70, and each construct's average variance extracted (AVE) must be higher than 0.50. The latter means that the construct explains at least 50 percent of the variance in its indicators. Inspection of these statistics in Tables II and III shows 32 of the 34 indicators to have loadings of at least 0.70. Two indicators fall short: PERCR (0.694) and PERQ5 (0.671). In keeping with the advice given in Hair *et al.* (2016), after assessing the impact on content validity, and taking into account that the values are very close to the threshold for inclusion, we decided to retain these indicators. The AVE figures in Table III exceed the minimum level of 0.50.

Finally, we inspect the discriminant validity of the measures. Visual inspection of the cross-loadings matrix (not included for reasons of space) shows the own-loadings of each construct to be far higher (2–3 times) than the cross-loadings with other constructs. A more formal measure of discriminant validity is the Fornell–Larcker criterion (Fornell and Larcker, 1981), which requires that a construct shares more variance with its own indicators (AVE) than with any other construct (squared correlation). The results in Table III, displaying the squared bivariate correlations and AVE for each construct, show this to be the case.

Having verified that the measurement model satisfies accepted benchmarks for reliability and validity, we are now ready to interpret the structural model relationships.

6.2 Structural model

Before going into specifics, the main structural model results are given in Figure 2, and the hypothesis testing results summarized in Table IV.

Between Figures 1 and 2, some causal links have been dropped for lack of statistical significance (the dashed lines in the former). In this and later figures, dashed lines represent causal links for which the significance level (p-value) is above 10 percent. Dotted lines refer

Latent variable	Variable name	Cronbach's α	Composite reliability	Eigenvalues	Standardized loadings (bootstrap)
Image	IMAG1	0.852	0.901	2.777	0.763
	IMAG2			0.554	0.847
	IMAG3			0.363	0.868
	IMAG4			0.305	0.839
Communication	COMM1	0.787	0.863	2.453	0.719
	COMM2			0.655	0.741
	COMM3			0.572	0.832
	COMM4			0.319	0.826
Expectation confirmation	EXPE1	0.800	0.883	2.147	0.870
	EXPE2			0.535	0.879
	EXPE3			0.318	0.790
Perceived risk	PERCR1	0.842	0.895	2.725	0.865
	PERCR2			0.633	0.807
	PERCR3			0.354	0.763
	PERCR4			0.289	0.694
Perceived quality	PERQ1	0.826	0.878	2.957	0.779
	PERQ2			0.699	0.732
	PERQ3			0.516	0.836
	PERQ4			0.494	0.818
	PERQ5			0.333	0.671
Perceived value	PERV1	0.863	0.936	1.760	0.936
	PERV2			0.240	0.940
Satisfaction	SATI1	0.905	0.941	2.522	0.907
	SATI2			0.288	0.913
	SATI3			0.190	0.932
Trust	TRUS1	0.781	0.872	2.086	0.820
	TRUS2			0.492	0.861
	TRUS3			0.423	0.810
Complaint handling	COMH1	0.878	0.925	2.413	0.899
	COMH2			0.361	0.863
	COMH3			0.226	0.929
Continuance intention	CONI1	0.887	0.930	2.449	0.911
	CONI2			0.328	0.909
	CONI3			0.224	0.892

Table II.
Cronbach's α, composite reliability, and factor loadings

to paths with significance between 5 and 10 percent. More detailed results for continuance intention and satisfaction are given in Table V.

The structural model explains 58.5 percent of the variance in continuance intention, with satisfaction having the strongest direct effect (standardized path coefficient of 0.634; effect size 0.49). According to Cohen's rule (Hair *et al.*, 2016) – effect sizes of at least 0.35, 0.15 and 0.02 are considered large, medium and small, respectively – this is a "large" effect in a substantive sense. Perceived risk (−0.141; 0.046) has a "small" effect, whereas trust and perceived quality have a statistically significant direct effect with an effect size below the "small" threshold. Trust (0.395; 0.209), however, does have a "medium" effect on continuance intention's strongest driver satisfaction.

A complete analysis of the drivers of continuance intention must consider both the direct and indirect effects. Table VI shows the direct, indirect and total effect of the independent variables on continuance intention, sorted in declining order of total effect. These numbers show that the indirect effects can be substantive. Satisfaction remains the leading driver of continuance intention (total path coefficient 0.634), followed by trust (0.403) and confirmation of expectations (0.263). At some distance follow image (0.143), perceived risk (−0.141), perceived value (0.128) and perceived quality (0.112).

Table III.
Squared correlations and average variance extracted

Squared bivariate correlations	Image	Communication	Confirmation	Perceived risk	Perceived quality	Perceived value	Satisfaction	Trust	Complaint	Continuance intention	Mean communalities (AVE)
Image	*1*	0.147	0.116	0.109	0.159	0.120	0.138	0.122	0.039	0.084	0.693
Communication	0.147	*1*	0.238	0.056	0.326	0.236	0.269	0.412	0.293	0.181	0.608
Confirmation	0.116	0.238	*1*	0.087	0.409	0.231	0.332	0.232	0.125	0.264	0.716
Perceived risk	0.109	0.056	0.087	*1*	0.117	0.095	0.089	0.091	0.028	0.021	0.579
Perceived quality	0.159	0.326	0.409	0.117	*1*	0.263	0.321	0.362	0.103	0.243	0.590
Perceived value	0.120	0.236	0.231	0.095	0.263	*1*	0.343	0.350	0.101	0.346	0.880
Satisfaction	0.138	0.269	0.332	0.089	0.321	0.343	*1*	0.445	0.136	0.553	0.840
Trust	0.122	0.412	0.232	0.091	0.362	0.350	0.445	*1*	0.161	0.334	0.692
Complaint	0.039	0.293	0.125	0.028	0.103	0.101	0.136	0.161	*1*	0.099	0.804
Continuance intention	0.084	0.181	0.264	0.021	0.243	0.346	0.553	0.334	0.099	*1*	0.816
Mean communalities (AVE)	0.693	0.608	0.716	0.579	0.590	0.880	0.840	0.692	0.804	0.816	*0*

Hypothesis	Accepted?
H1a. Corporate image → satisfaction (+)	Yes
H1b. Corporate image → continuance Intention (+)	No
H2a. Confirmation → satisfaction (+)	Yes
H2b. Confirmation → continuance intention (+)	No
H3a. Perceived quality → satisfaction (+)	Yes
H3b. Perceived quality → continuance Intention (+)	Yes
H4a. Perceived value → satisfaction (+)	No
H4b. Perceived value → continuance Intention (+)	Yes
H5a. Communication → satisfaction (+)	No
H5b. Communication → continuance intention (+)	No
H6a. Trust → satisfaction (+)	Yes
H6b. Trust → continuance intention (+)	Yes
H7a. Perceived risk → satisfaction (–	No
H7b. Perceived risk → continuance Intention (–)	Yes
H8a. Complaint handling → satisfaction (+)	No
H8b. Complaint handling → continuance intention (+)	No
H9. Satisfaction → continuance intention (+)	Yes

Table IV.
Hypothesized relationships

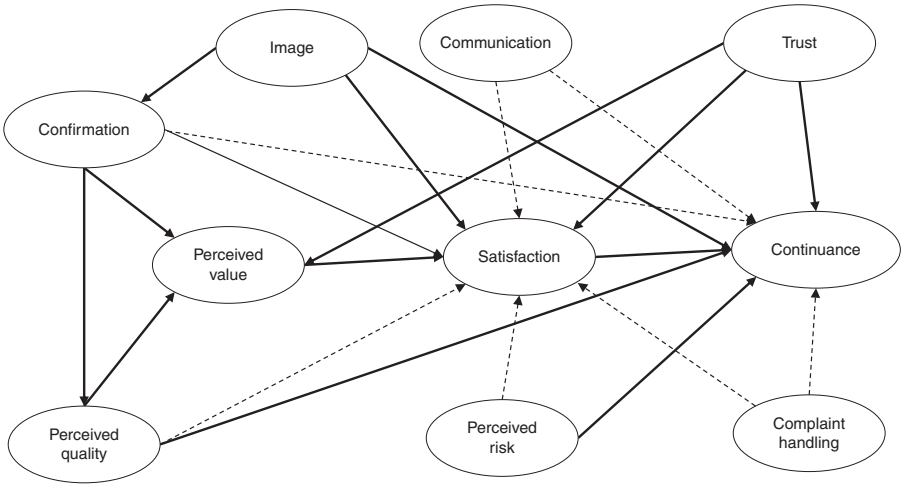

Figure 1.
Initial model

6.3 Latent segments

To investigate the existence of latent segments, we ran the response-based unit segmentation partial least squares procedure (Esposito Vinzi *et al.*, 2008). This procedure performs a hierarchical clustering of respondents based on their standardized path scores and PLS model estimation simultaneously. The most meaningful split in terms of data interpretation happens going from 1 to 2 segments, with one segment relatively more influenced by variables related to observable performance, and another relatively more driven by intangible, credence-type variables. The structural models are displayed in Figure 3 (Performance segment) and Figure 4 (Credence segment).

Satisfaction (0.532 and 0.650) has the strongest direct effect on continuance intention for both segments. Perceived quality has the next highest direct standardized path coefficient in the performance segment (0.188), but no statistically significant direct effect for consumers in the credence segment. Moreover, within the performance segment, the impact of

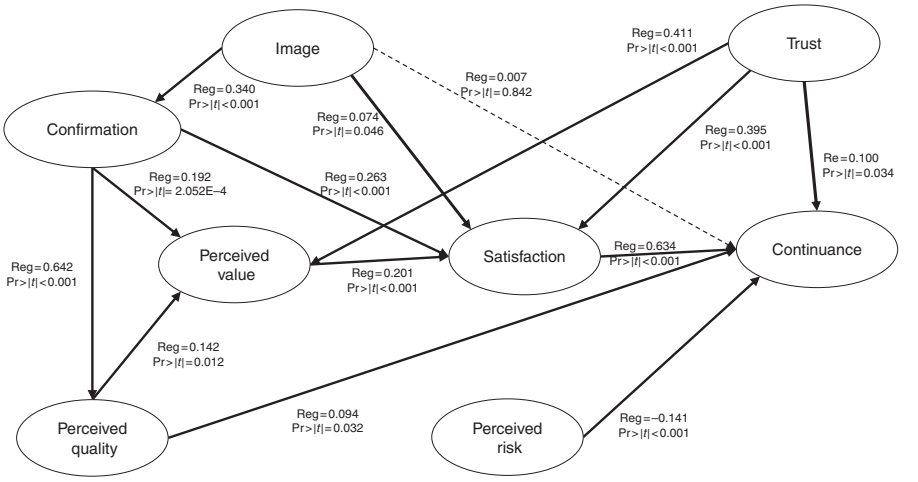

Figure 2.
Overall model after stepwise elimination

Latent variable	Path coefficient	Pr > |t|	Effect size	Interpretation
Dependent variable: satisfaction ($R^2 = 0.559$)				
Trust	0.395	0.000	0.209	Medium
Confirmation	0.263	0.000	0.108	Small
Perceived value	0.201	0.000	0.054	Small
Image	0.074	0.047	0.010	–
Dependent variable: continuance intention ($R^2 = 0.585$)				
Satisfaction	0.634	0.000	0.490	Large
Perceived risk	−0.141	0.033	0.046	–
Trust	0.100	0.034	0.012	–
Perceived quality	0.094	0.032	0.012	–
Image	0.007	0.842	0.000	–

Table V.
Structural model results

Variable	Direct	Indirect	Total
Satisfaction	0.634	0.000	0.634
Trust	0.100	0.303	0.403
Confirmation	0.000	0.263	0.263
Image	0.007	0.136	0.143
Perceived risk	−0.141	0.000	−0.141
Perceived value	0.000	0.128	0.128
Perceived quality	0.094	0.018	0.112

Table VI.
Direct, indirect and total effects of variables on continuance intention and satisfaction

perceived quality on continuance intention is entirely direct, in contrast with those in the credence segment for whom the effect is fully mediated via perceived value and satisfaction. In the credence group, the strongest paths leading directly into continuance intention (other than satisfaction) are those associated with perceived risk (−0.208) and trust (0.138). In contrast, trust has no statistically significant direct effect on continuance intention in the performance segment (p-value 0.128), although it does impact its antecedents satisfaction and perceived value.

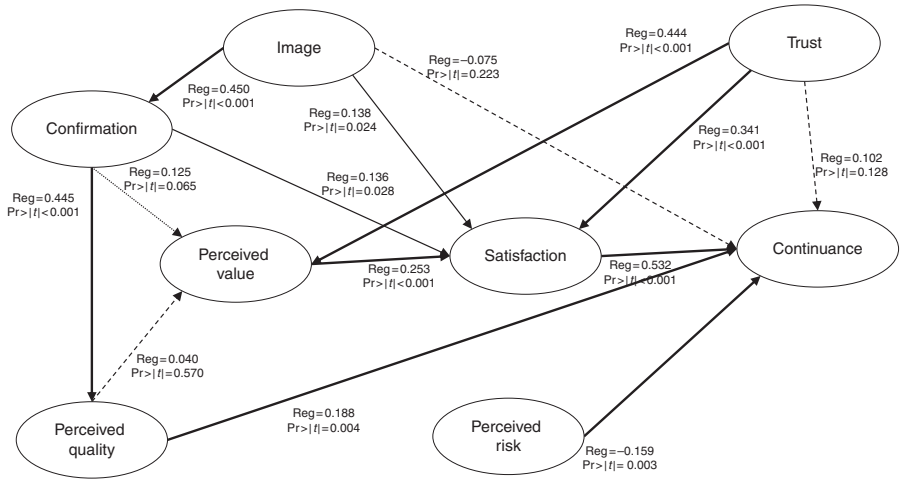

Figure 3.
Performance segment

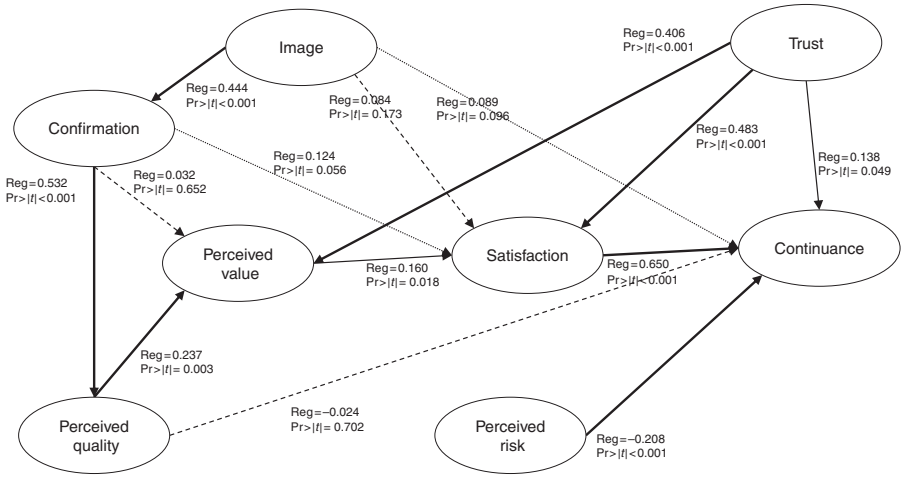

Figure 4.
Credence segment

As before, we inspect the combined direct and indirect effects on continuance intention. Looking at the total effects in Table VII, satisfaction and trust are the two main drivers for both segments[1]. Beyond these two drivers there are pronounced differences between segments, however. Consumers in the performance segment are relatively more driven by perceived quality (0.188 vs 0.025), confirmation (0.175 vs 0.084) and perceived value (0.135 vs 0.104), whereas those in the credence group are relatively more driven by trust (0.494 vs 0.344), perceived risk (−0.208 vs −0.159) and image (0.181 vs 0.077).

Both segments are of a substantial size ($n = 212$ for performance and 187 for credence). Given the sample limitations, relative segment size is only roughly indicative, however.

In order to better understand the nature of the segments, Table VIII displays the scale averages by segment. These figures are computed by calculating respondents' average scale ratings for each measured construct. The performance group has higher mean scores on all constructs, with a lower standard deviation. With the exception of perceived risk, the higher

the score, the more favorable the perception[2]. The performance group also has a higher usage frequency as can be seen in Table IX. Customers' usage frequency could therefore be used as a proxy for segment membership, allowing practitioners to tailor in-app marketing communications.

Although speculative and subject to further research, a possible explanation is that the performance segment constitutes a more innovation-prone, early adopter, already more experienced group. This would be consistent with their higher usage rate and on average higher scale scores with lower variance. For such consumers it makes sense to be more tuned into the observable performance attributes of mobile banking. The credence segment in contrast might be later, more recent adopters. Late adopters are typically more subject to social influences, or they might have been nudged by their bank into adopting mobile banking. Consumers in this segment use mobile banking less and are therefore likely to be less savvy, which would explain their greater reliance on credence attributes. Unfortunately, the questionnaire does not include questions on adoption drivers, innovation proneness or timing of adoption, so we leave this for future research. Future research could also look into whether segment membership is determined mainly by stable personality traits, or whether segment membership is dynamic. The second perspective assumes that people will migrate from the credence to performance segment with cumulative experience.

Table VII.
Total (direct + indirect) effect of variables on continuance intention

Variable	Performance segment	Credence segment
Satisfaction	0.532	*0.650*
Trust	0.344	*0.494*
Confirmation	*0.175*	0.084
Image	0.077	*0.181*
Perceived risk	−0.159	*−0.208*
Perceived value	*0.135*	0.104
Perceived quality	*0.188*	0.025
n	212	187

Table VIII.
Mean scale item scores by segment

Construct	Segment	Mean	SD	*p*-value
Image	Performance	4.09	0.60	0.104
	Credence	3.98	0.71	
Confirmation	Performance	4.17	0.38	0.000
	Credence	3.13	0.43	
Perceived quality	Performance	4.00	0.46	0.000
	Credence	3.44	0.60	
Perceived value	Performance	4.11	0.63	0.000
	Credence	3.55	0.78	
Communication	Performance	3.73	0.53	0.000
	Credence	3.30	0.64	
Trust	Performance	3.98	0.48	0.000
	Credence	3.63	0.66	
Perceived risk	Performance	3.70	0.68	0.044
	Credence	3.56	0.76	
Complaint handling	Performance	3.44	0.66	0.000
	Credence	3.02	0.69	
Satisfaction	Performance	4.11	0.52	0.000
	Credence	3.54	0.68	
Continuance intention	Performance	4.02	0.55	0.000
	Credence	3.42	0.79	

6.4 Demographic segments

Demographic segmentation is ubiquitous in marketing, not only because consumer behavior often differs by segment, but also because it is relatively easy to enact marketing programs targeting specific demographic groups. It is therefore of practical interest to know whether continuance drivers vary substantially across demographic segments. Moreover, as mentioned earlier in the sample description, women and young adults make up a disproportionate section of the sample, which raises questions about external validity that need to be answered.

To address these points, we re-estimate the model with gender and age splits. The income range in the sample was too narrow to expect substantial variations. Table X shows the *p*-values for the differences in path coefficients between gender and age segments (two age groups with a split at 30) for satisfaction and continuance intention. With the exception of a gender difference in the confirmation to satisfaction path (higher path coefficient for women), none of the differences in path coefficients are statistically significant. For the focal variable of this study, continuance intention, none of the differences in path coefficients are statistically significant. We also ran a cross-tabulation to investigate if latent segment membership varies by gender and age. The answer is that it does not. For space reasons we omit the full results but none of the χ^2 values are statistically significant (two-tailed significance value of 0.74 for gender and 0.22 for age).

The practical implication is that, at least when it comes to app satisfaction and continuance, bank managers should look elsewhere for meaningful segmentation bases. Importantly, the results are reassuring regarding the external validity concerns mentioned in Section 5.

7. Discussion

7.1 Implications for researchers

This paper adds new empirical results to a very sparse literature. Overall, our results are consistent with earlier findings. This study also extends the existing base of work by reporting substantial differences between segments and demonstrating that some of the key constructs have a direct effect on continuance intention (not just indirect, as commonly assumed).

App usage frequency	Performance (%)	Credence (%)	Total (%)
Less than once a month	8.5	21.9	14.8
1–2 times a month	29.2	31.0	30.1
3–4 times a month	19.8	17.6	18.8
> 4 times a month	42.5	29.4	36.3
Total	100.0	100.0	100.0

Notes: $n = 399$; $\chi^2 = 17.139$; df = 3. Sig. (two-tailed) = 0.001

Table IX. Frequency of mobile banking use

Path coefficient	Groups	Gender *p*-value	Age *p*-value
Trust → satisfaction	1 vs 2	0.772	0.926
Confirmation → satisfaction	1 vs 2	*0.008*	0.245
Perceived value → satisfaction	1 vs 2	0.460	0.082
Image → satisfaction	1 vs 2	0.388	0.645
Satisfaction → continuance intention	1 vs 2	0.111	0.955
Confirmation → continuance intention	1 vs 2	0.595	0.968
Trust → continuance intention	1 vs 2	0.160	0.148
Perceived risk→ continuance intention	1 vs 2	0.178	0.311

Table X. *p*-values of gender and age differences

Taking into account direct and indirect effects, satisfaction and trust are the strongest drivers of continuance intention. This holds true in the aggregate as well as in the two latent segments that emerge from the data. In the overall sample, confirmation is the third most important driver, although this appears to be driven mainly by the performance segment.

The finding for satisfaction is consistent with earlier results reported in the context of mobile banking apps (Yuan *et al.*, 2016; Kumar and Ravindran, 2012). The strong link between satisfaction and loyalty in general is well established in the marketing literature, so it is unsurprising to find it again here.

Likewise, trust has been found to be a key driver in prior work (Chen, 2012; Zhou, 2013; Yuan *et al.*, 2016, Ofori *et al.*, 2017). What is noteworthy is the relatively high importance of trust, compared to, for instance, perceived risk. A possible explanation is that risk matters more in the adoption decision. Once consumers have been using the mobile banking app for some time without incident, it is natural that they become less preoccupied with risk, whereas perceiving the bank as trustworthy remains important.

As mentioned in the literature review, earlier results about the importance of perceived risk are mixed. Two prior studies (Yuan *et al.*, 2016; Kumar and Ravindran, 2012) found evidence of its impact on continuance intention, whereas a third by Chen (2012) found no significant impact. In this study, we find a statistically significant (negative) impact, albeit a relatively smaller one than especially Yuan *et al.* (2016). In that study, perceived risk is the strongest driver of continuance intention among the included constructs. Going back to Table VI, in this study risk (−0.141) has a relatively small total impact compared to satisfaction (0.634), trust (0.403) and confirmation (0.263).

This study is to our knowledge the first to explore the nature of consumer heterogeneity in this area. Two segments emerge from the data with quite different drivers. One is influenced more by search attributes like perceived quality, confirmation and perceived value, compared to another segment for which trust, image and perceived risk are relatively more important. We called these the performance and credence segments. It would be worthwhile to explore in future research whether these segments are driven by stable personal characteristics such as innovation proneness, or if people migrate from the credence to performance group as they gain greater experience with the app. The performance segment has more frequent app use and higher average satisfaction as well as more favorable mean responses on the other constructs. What the data are inconclusive about is whether this is the result of cumulative experience, or whether consumers in this segment are more favorably inclined toward innovation in general.

Finally, the exploratory approach we took proved useful. Had we followed a more theory-driven approach, we might have adopted the ECSI model in full. Given the specific nature of the main construct of interest, however – continuance intention rather than loyalty in general – we decided on a more empirical approach that led to somewhat different results. For instance, in the ECSI, the impact of confirmation and perceived quality on loyalty is fully mediated via perceived value and satisfaction, whereas our findings show a direct effect next to a partially mediated one. The methodological point is to use established frameworks flexibly when applying them to a related but different context.

7.2 Implications for practitioners

In addition to the substantive results mentioned above, managers should take note of the relatively high importance of trust (second most important variable after satisfaction) as a driver of app continuance. It would be understandable for bank managers to focus primarily

on tangible service features and programs, and to dismiss trust as too amorphous and "soft." The high impact of trust underscores the need to be proactive about managing it. For instance, important bank decisions could be evaluated with respect to how they impact trust, communications programs could be designed with express intent to strengthen trust, and a short scale for trust could be added to the bank's ongoing panel research.

The knowledge that there are two sizeable segments with an intuitive interpretation is also potentially useful to practitioners. The performance and credence segments have different drivers of app satisfaction and continuance. With this realization, bank marketers can design differential approaches to maximize these outcomes. The results in Table IX point to a way to operationalize this. Frequency of mobile banking use is higher in the performance segment, so this can be used as a first proxy for segment membership. With regard to segmentation, given the prevalence of gender and age-based segmentation, it is also worth repeating that these variables are not useful in this context.

7.3 Limitations and conclusions

As with any study of this kind, questions about generalizability arise. The absence of gender or age segments in the data allays our concerns somewhat, but even so, most respondents live in the greater Bangkok area and belong to the middle class. While the middle class is probably the primary focus for bank marketers in Thailand, there is also a large low-income section of the population who are neglected in this research. Moreover, it is plausible that country-specific cultural elements play an important role with constructs like trust and risk. This study adds to a scant empirical base, and it is encouraging that the results are consistent with prior work, but much more empirical work needs to be done.

Our own conversations with practitioners in various contexts (supermarket retail, telecom, car telematics, banks, etc.) suggest that while apps are often downloaded, getting consumers to become repeat users is a major challenge. Given the trend toward digitization in banking and business in general, we believe the topic of app satisfaction and continuance to be of great practical importance and deserving of additional research.

Notes

1. Note that since the path coefficients are standardized and therefore dependent on the variance within a sample, comparisons between sub-samples are strictly speaking incorrect and should be interpreted with care. The proper interpretation of the relative size of these standardized coefficients is within a sample.
2. Even so, for perceived risk the difference between the two segments (0.14) is relatively small compared to the difference for other constructs like confirmation (1.04), perceived quality (0.56), satisfaction (0.57) and continuance intention (0.60). The halo effect between rating scale items (Cooper, 1981; Bernardin and Walter, 1977) provides an explanation for why perceived risk has a higher mean score in the performance segment.

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Appendix. Questionnaire items for model constructs

Brand image (Chitty *et al.*, 2007)
IMAG1: the reputation of my bank is important to me.
IMAG2: my bank makes a good impression on its customers.
IMAG3: my bank has a good reputation among the public.
IMAG4: I feel my bank suits my needs.

Confirmation (Bhattacherjee, 2001a)
EXPE1: mobile banking's execution of trades meets my expectations.
EXPE2: the functionality provided by mobile banking meets my expectations.
EXPE3: I generally get the level of service I expect from mobile banking.

Perceived quality (Chen, 2012)
PERQ1: my mobile banking application is well organized.
PERQ2: my screen does not freeze after I enter an order while using mobile banking.
PERQ3: mobile banking is truthful about its offerings.
PERQ4: mobile banking makes accurate promises about delivery of products and services.
PERQ5: mobile banking does not share my personal information with other companies.

Perceived value (Baptista and Oliveira, 2015)
PERV1: mobile banking services are reasonably priced comparing with other banking channels.
PERV2: mobile banking services are good value for money.

Communication (Ball *et al.*, 2004)
COMM1: I have an easy and satisfactory relationship with my bank.
COMM2: the bank keeps me constantly informed of new products and services that could be in my interest.
COMM3: personal service and advice of my bank is good.
COMM4: clarity and transparency of information provided by my bank is very good.

Trust (Ball *et al.*, 2004)
TRUS1: overall, I have complete trust in my bank.
TRUS2: when the bank suggests mobile banking, it is because it is best for my situation.
TRUS3: the bank treats me in an honest way in every transaction.

Perceived risk (Chang *et al.*, 2012; Chen, 2012)
PERCR1: I am confidently aware of the risks associated with mobile banking.
PERCR2: I think mobile banking is risky and dangerous to use.
PERCR3: there is a considerable risk in participating in mobile, rather than traditional, banking.
PERCR4: there is a considerable risk in participating in mobile, rather than online, banking.
PERCR5: on the whole, considering all factors combined, it is very risky if I sign up for and use mobile banking.

Complaint handling (Askariazad and Babakhani, 2015)
COMH1: the bank handles complaints well (quality of compensation offered).
COMH2: the bank handles complaints well (employees are respectful).
COMH3: the bank handles complaints well (employees are polite).

Satisfaction (Bhattacherjee, 2001a)
SATI1: I am satisfied with my decision to use mobile banking.
SATI2: my choice to use mobile banking was a wise one.
SATI3: I think I did the right thing by deciding to use mobile banking.

Continuance intention (Bhattacherjee, 2001a)
CONI1: I want to continue using mobile banking rather discontinue its use.
CONI2: my intention is to continue using mobile banking rather than any alternative means.
CONI3: I am likely to recommend mobile banking to friends, neighbors, and relatives.

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