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Investigating customers' continuous trust towards mobile banking apps

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Gaining continuous trust from mobile banking customers is a critical step in retaining customers for their usage of the provided services. The current study aims to investigate how customers' continuous trust is formed at the continuous-use stage. Online survey responses from 450 frequent mobile banking users are collected. The data were analysed using structural equation modelling (SEM) based on a proposed model that predicts trust. The findings successfully validated the model and its reduced form. Based on the model, customers' continuous trust can be predicted by mobile banking apps' perceived ease of use, privacy assurance and security features, organisation reputation, customer support, and customers' previous experience. Furthermore, the interactive relationships among these proposed factors are proposed and validated in the model. By studying trust in mobile banking past the initial adoption stage, we provide evidence to support the theoretical framework of investigating mobile banking continuous trust from the three constructs—mobile app (perceived ease of use, privacy assurance, security features), organisation (reputation, customer support), and customer (prior experience).

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Introduction

Today, over 6.3 billion smartphone users have been reported worldwide (Statista, 2021), with a projected growth of almost hundreds of millions more per year. With the increased utilisation and development of mobile communication technology (Ahmad et al., 2020), wireless communication is seeing similarly rapid growth in its speed and reliability (Painuly et al., 2020; Srivastava and Fernandes, 2022). Jointly, these recent technological advances have effectuated the shift of consumer demand across various sectors towards online transactions, greatly enhancing user mobility and access (Cassioli and Balconi, 2022; Souiden et al., 2019).

Banks have been among the first in the financial service sector to rapidly transform and adapt interpersonal services to mobile-based channels (Alsmadi et al., 2022; Souiden et al., 2021). This advancement has revolutionised the industry both for operating firms and their general user base. On the one hand, this has driven firms to optimise financial and customer services to retain users and remain competitive within the industry in times of rapid technological innovation. To maintain their competitive edge, banks may strive for efficient development and effective designs—ideally informed by the consumer's perspectives. The need for in-depth analysis of the drivers of consumer behaviours has directed studies of mobile banking towards themes such as building long-term relationships, brand loyalty, and, more recently, continuous trust (Hoehle et al., 2012b; Kosiba et al., 2018).

For this technology to thrive in the long term, continuous trust is crucial. However, despite the added utility noted above, potential risks, including private information leaks, hacking, lack of control, and poor experiences, may equally deter users from continued use of the application (Wessels and Drennan, 2010; Zhou, 2012b). Being physically unable to directly interact with the service provider beyond a phone screen, mobile banking interactions may be perceived as limited and insecure. This is a challenge in fully retaining high-level trust to effectively mitigate anxiety and perceived threats associated with these risks (Hernández-Ortega, 2011). Insights to optimise trust may enhance design for user experience, maintain mass usage, and inform brand loyalty (Jamshidi et al., 2018; Kaur et al., 2023; Kosiba et al., 2018).

Continuous trust refers to trust developed past the initial adoption stage into the continuous-use stage (Siau and Shen, 2003). At the continuous-use stage, relative amounts of exposure and experience with the technology can be expected (Hoehle et al., 2012a). It is noted to be one of the key factors contributing to retention and forming continuous-use intentions (Li and Xue, 2021). Mobile banking research on trust is typically focused on the initial adoption stage (Chong et al., 2012) or on investigating behavioural and, more recently, continuance usage intentions of the application (Ghobakhloo and Fathi, 2019; Kala Kamdjoug et al., 2021; Lin et al., 2023).

Trust is a dynamic relationship and can change throughout the duration of the interaction (Li and Xue, 2021). The needs of the customers may change over time after initial adoption. Clearly, at a later stage of market penetration, maintaining continuous, long-term trust proves increasingly relevant. Additionally, as the user is physically unable to interact directly with mobile banking services beyond a phone screen, individuals may further perceive the interaction as limited and insecure, proving challenging to fully retain trust in these intangible interactions. Simply offering mobile banking services may begin to be insufficient in remaining competitive, making it imperative for banks nowadays to actively seek early strategies for retaining their existing customer base after initial adoption (Al-Ghazali et al., 2015). High levels of trust have been argued to effectively mitigate the anxiety and perceived threat associated with these risks, further confirming long-term

trust as an important factor (Jamshidi et al., 2018). Understanding how existing users perceive various features and understanding their preferences may provide insights for optimising user experience, maintaining mass usage and informing brand loyalty (Cuesta-Valiño et al., 2023; Zhou et al., 2021). Despite this, such understandings are not systematically discussed in existing studies. How to retain user trust remains unclear and lacks a theoretical foundation. Previous research (Mittal and Lassar, 1998) has reported "that the cost of attracting new customers is five times higher than the cost of retaining existing ones" (Petrović et al., 2022, p. 1613). The theoretical and statistical models directly examining continuous trust, especially in mobile banking, are not fully understood despite being an increasingly key area of interest. It leads to the following research questions:

RQ1: What are the contributing factors effecting mobile banking customers' continuous trust;

RQ2: And to what extent are these effects being manifested?

In the present study, we propose a model of features informing continuous trust in mobile banking. We aim to identify critical antecedents for continuous trust and examine how they inform continuous trust. Potential constructs include perceived ease of use, privacy assurance and security features, information quality, organisation reputation, customer support, propensity to trust, and previous experience. The validation of the proposed model is achieved by analysing survey data from a sample of existing mobile banking users through structural equation modelling (SEM). The common features and constructs in mobile banking research have been included in the research frame for continuous trust. Our research contributes to the theoretical framework of studying mobile banking continuous trust by mobile app, organisation, and customer constructs (Beldad et al., 2010) and provides insights aiding banks to develop informed, realistic strategies for strengthening customer interaction and experience.

The rest of the article is organised into four sections: Conceptual framework, Methods, Results, and Discussion and conclusion. The "Conceptual framework" section reports the antecedents we have drawn from past research and how they are integrated into a unified model. The "Methods" section presents the questionnaire design and survey administration. The "Results" section reports the analysis results. The last section discusses the findings and implications and then conclusions.

Conceptual framework

Past research on mobile banking focuses on the adoption models such as the Technology Acceptance Model (Davis, 1989), Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), Stimuli-Organism-Response (S-O-R) framework (Mehrabian and Russell, 1974; Shahid et al., 2022). The extant mobile banking literature has generally identified three distinct clusters of latent constructs that predict trust—mobile application-related, organisation-related, and customer-related antecedents (Beldad et al., 2010). This section briefly refers to trust in the continuous-use stage with reference to these perceptions. Guided by the following hypotheses, we further relate constructs to form two models proposed for validation.

Customers' continuous trust in continuous-use stage. Trustworthiness is defined in retailing literature as "the subjective belief with which organisational members collectively assess that a population of organisations will perform potential transactions according to their confident expectations, irrespective of their

ability to fully monitor them" (Pavlou, 2002, p. 218). Due to temporal and spatial gaps in the mobile network, mobile banking generally involves greater risks as compared to offline banking settings (Zhou, 2012a). Prior to initiating a transaction, customers may first need to build sufficient levels of trust towards the platform and its services. While online trust has been studied extensively (Beldad et al., 2010; Kim and Peterson, 2017; Koufaris and Hampton-Sosa, 2004), research specifically on trust in mobile banking is still argued to be lacking (Kaushik et al., 2020).

Trust is differentiated between initial and continuous trust (trust at a continuous-use stage) (Lin et al., 2014; Zhou, 2012a), modulated by differing antecedents in the existing literature. While both types of trust studies have identified common antecedents such as perceived security and privacy, information quality, organisation reputation (Kaushik et al., 2020; Olaleye et al., 2019; Sun et al., 2017), these findings are often inconsistent, with some studies also having highlighted the significant influence of a customer's previous experience leading to continuous trust (Jamshidi et al., 2018; Rajaobelina et al., 2021). The key difference between these two threads of investigation is the stage of the interaction at the time. These factors are categorised and discussed in the following sections.

Mobile banking app-related antecedents
Perceived ease of use (PEU). This concept is derived from the technology acceptance model (TAM), defined as "freedom from effort" spent while using or learning to use a new technology (Davis, 1989). Ease of use in mobile banking services might be influenced by the user-friendliness of interface design, information presentation style, and the general ease of interaction with the application (Jebarajakirthy and Shankar, 2021; Lee and Chung, 2009). Compared to online banking on computers or tablet devices, mobile phone screens are significantly smaller, greatly limiting the amount of information to be displayed. As such, users may at times find the application challenging to use or be lacking in some way due to inadequate design. We can expect easier-to-use systems to reduce transaction anxiety and contribute towards greater trust building (Chien et al., 2012; Sharma and Kakkar, 2022). In mobile banking trust studies, the findings on the relationship between perceived ease of use and trust have not yet reached a consensus. While studies on both continuous trust (Petrović et al., 2022; Zhou, 2012a) and initial trust (Kaushik et al., 2020) generally support a positive association with increased ease of use, some studies in South Africa (Van Deventer, 2019) and Korea (Gu et al., 2009) have found this relationship to be insignificant. Thus, we seek to test the following hypothesis:

> H1: Customers' perceived ease of use positively influences their continuous trust in mobile banking.

Privacy assurance and security features (PASF). Privacy and security assurances have been considered vital in a customer's evaluation of trustworthiness (Beldad et al., 2010; Sharma et al., 2018). It specifically refers to any protective measures such as guarantees, contracts, regulations, or transaction procedures that might effectively assure the customer of their expected outcomes (Chien et al., 2012). Mobile banking typically involves high-risk financial transactions, private credit cards or bank account information. Users may choose to revert or disengage from the service due to a fear of perceived risks and harm. As such, these assurances become even more critical in gaining customers' trust in the absence of any physical services. Studies have demonstrated this importance and strong link to trust (Kumar et al., 2017; Singh and Srivastava, 2018; Zhou, 2012a, Akturan and Tezcan, 2012). Herein, the following hypothesis is examined in the study:

> H2: The privacy assurance and security features positively affect customers' continuous trust in mobile banking.

Information quality (IQ). According to Beldad et al. (2010), information quality refers to the usefulness, completeness, and accuracy of the information provided to customers. It is argued that if irrelevant or misguided information were to be provided, customers' trust towards mobile banking service providers might be negatively affected (Zhou, 2013). This argument has been supported by findings from some past research (Berraies et al., 2015; Geebren et al., 2021; Zhou, 2013, Shareef et al., 2018), though there have also been instances where no significant relationship between information quality and trust was observed (Trabelsi-Zoghlami et al., 2020). As such, the following hypothesis was included for testing:

> H3: Higher information quality positively affects customers' continuous trust in mobile banking.

Company-related antecedents
Organisation reputation (OR). Higher-rated or more reputable organisations generally garner a more positive or trustworthy relationship with customers (Beldad et al., 2010; Özkan et al., 2020). In online banking settings, an organisation's reputation can be assessed as the company's credibility in delivering services and reliably catering to its customers' interests (Kaushik et al., 2020; Lee and Chung, 2009). Maintaining a positive organisational reputation requires large amounts of resources and consistent reinforcement, and this image rapidly declines with just a few mishaps. Particularly as banking is such a high-risk activity, a bad reputation could be detrimental to the future dealings of a company. As such, customers might understandably tend to trust companies with better reputations where it can be assumed that risking reputational damage outweighs the potential gains of sacrificing their customers' interests (Koufaris and Hampton-Sosa, 2004). The following hypothesis is hence proposed:

> H4: Positive organisation reputation leads to higher trust from customers in mobile banking.

Customer support (CS). In online banking, customer support is generally delivered through technology-based channels such as call centres (including phone and email), chat bots, and integrated feedback functions within the app itself (Ganguli and Roy, 2011). A key difference in the customer support experience in mobile banking as compared to traditional banking services is the absence of any face-to-face interactions with the service provider (Thakur, 2014). This lack of social presence may add to the perceived structural insecurity and lack of quality customer support. Especially as customers typically only seek customer support when faced with urgent, problematic circumstances, the expectations associated with each interaction are likely to be high. On the other hand, critical and timely support reflects good reliability (Trabelsi-Zoghlami et al., 2020) and thus facilitates positive experiences (Shahid et al., 2022). This may strengthen a customer's trust, enabling continuous interaction with the mobile banking application based on this assurance (Johannes et al., 2018). As such, the following hypothesis is included:

> H5: The perceived level of customer support positively influences continuous trust in mobile banking.

To date, past studies in mobile banking trust mostly focused on the direct effects of the above variables. However, it is reasonable to argue that in the absence of professional knowledge of the mobile banking app, a customer's perception of the app should

also be influenced by how reputable these organisations have proven to be and the degree of support they are offered. A recent mobile banking trust study (Garrouch, 2021) explored the relationship between organisation reputation and the perceived security level of an app. The current study attempts to extend this by testing how both organisation reputation and customer support could influence each of the stated app-related variables: organisation reputation on perceived ease of use (H4a), privacy assurance and security features (H4b), and information quality (H4c); customer support on perceived ease of use (H5a), privacy assurance and security features (H5b), and information quality (H5c). Besides these organisational supports for mobile banking customers, it is also important to understand their customers, such as previous experience with mobile banking and propensity to trust, as in the following section.

Customers-related antecedents

Propensity to trust (PTT). Refers to a customer's inherent disposition to trust others prior to any knowledge or experience to inform judgement (Gill et al., 2005). It is rooted in an individual's personality in terms of traits of openness to experience and risk-taking (Freitag and Bauer, 2016). This has particular implications for the initial adoption of mobile banking as customers attempt to accept new and innovative wireless transaction services with unknown risks (Beldad et al., 2010). However, studies have revealed conflicting findings. Some have shown a propensity to trust to be a significant antecedent to customers' trust (Kim et al., 2009; Zhou, 2011), while other studies have not shown support for the relationship (Kaushik et al., 2020; Zhou, 2012a). Furthermore, at a continuous-use stage, the effects of propensity to trust have not yet been commonly explored. To examine the potential influence of propensity to trust on continuous trust after the initial adoption stage, the following hypothesis is tested in the current study:

> H6: Customers' propensity to trust positively influence their continuous trust in mobile banking.

Previous experience (PE) with mobile banking. A customer's experience can be defined as their cognitive and affective response before, during, and after interacting with the provided service (Grewal et al., 2009). In studies of initial trust, experience is typically inferred as exposure to other related technology (Beldad et al., 2010). In mobile banking settings, for example, it refers to a customer's general familiarity and use of mobile banking applications (Kaushik et al., 2020). However, at this continuous-use stage, customers have already passed the initial adoption hurdle. Hence, we further developed the concept of previous experience to sufficiently capture subjective perceptions of mobile banking apps. We expect positive past experiences to contribute towards trust building and negative experiences to be associated with lower trust (Wessels and Drennan, 2010).

In some continuous trust studies, previous experience can also be interpreted as perceived flow of service (Rajaobelina et al., 2021), previous knowledge (Yu, 2015), satisfaction (Inan et al., 2023; Kazakov et al., 2021), and mobile experience (Rajaobelina et al., 2018). In each case, a positive relationship between previous experience and trust was established (Sun et al., 2017). Hence, to examine the effect of previous experience on continuous trust, we proposed the following:

> H7: Customers' previous experience positively influences their continuous trust in mobile banking.

Again, at a continuous-use stage, customers have since passed the initial adoption hurdle and demonstrated frequent exposure

to mobile banking services. Their perception towards these apps and providers has likely been heavily influenced by past individual experiences. This has implications for our model predicting continuous trust. In addition to a direct antecedent to trust, we therefore further expect previous experience to significantly influence other latent constructs, including perceived ease of use (H7a), privacy assurances and security features (H7b), information quality (H7c), organisation reputation (H7d), and customer support (H7e). However, as in the literature, we similarly maintain conceptualising propensity to trust as a stable personality trait directly related to continuous trust instead of a mediating factor.

Integrated model. The above-stated hypotheses postulate the seven identified latent constructs (perceived ease of use, privacy assurance and security features, information quality, organisation reputation, customer support, propensity to trust, and previous experience) as direct and indirect antecedents to trust. The full model is shown in Fig. 1.

Methods

Questionnaire design. Based on the constructed model, we designed a questionnaire rated on a 7-point Likert scale (1-Strongly disagree, 3-Neutral, 7-Strongly agree) with well-validated items adapted from previous questionnaires (see Appendix 1). Appendix 1 details the items for each of the latent constructs. In addition, we further incorporated items regarding respondents' age and gender to account for the effects of user demographics.

Survey administration and respondents' demographics. The survey study was approved by the Nanyang Technological University (NTU) Institutional Review Board (IRB reference number: IRB-2021-305) and carried out in accordance with relevant guidelines and regulations. The survey was administered online, and existing mobile banking users in China were invited to participate. Respondents were recruited from higher education institution communities and public residents in over ten major cities in China. The questionnaire was first designed in English. The English version was initially translated into Chinese by an author who spoke native Chinese. Subsequently, the translated rendition underwent examination and refinement during a focus group discussion involving six authors who are proficient in Chinese, thereby ensuring its linguistic and cultural validity. To avoid any bias introduced by the instrument, items for each construct were presented randomly. As the present study was concerned with continuous trust at a continuous-use stage, only respondents who used mobile banking on a regular basis were surveyed. This was achieved by adding a filter question at the beginning of the survey. We collected a total of 557 responses. Responses from duplicated IP addresses were removed to preserve validity. Forms with incomplete information were also excluded from the dataset. Furthermore, flat-lined responses (identical ratings for series of questionnaire items) were also deleted, as they indicate a lack of attention. After cleaning, a final sample of 450 responses was entered for further analysis.

Table 1 presents the respondents' demographic characteristics and their most frequently used banks. Slightly more male respondents (53.8%) were surveyed. The respondents' ages ranged from 19 to 50 years, with the age group of 19–25 years accounting for 37.6% of the respondents. The age and gender distributions generally fit with and are representative of the mobile banking user demographics in China (Wang and Petrounias, 2017).

Common method bias. As all constructs were collected via a single survey instrument using similar rating scales, it was
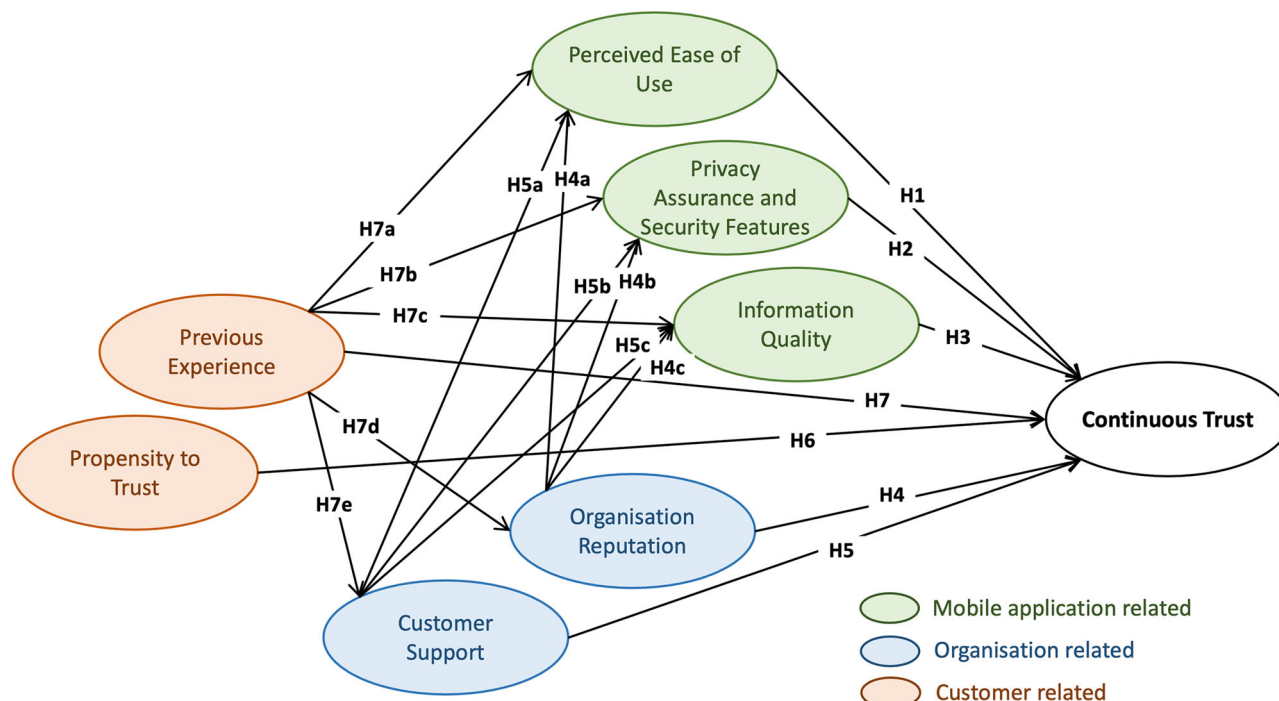
Fig. 1 Full model. The figure shows the full theoretical model derived from established hypotheses.

Table 1 Respondents' demographic characteristics (n = 450).

Characteristics	Attributes	Frequency	Percentage (%)	Frequently used banks	Frequency	Percentage (%)
Gender	Female	208	46.2	CCB	92	20.4
	Male	242	53.8	ICBC	80	17.8
Age	19–25 years	169	37.6	BOC	76	16.9
	26–30 years	71	15.8	CMB	67	14.9
	31–35 years	93	20.7	ABOC	47	10.4
	36–40 years	65	14.4	BOCM	28	6.2
	41–50 years	52	11.6	PSBC	20	4.4
				Other banks	40	8.9

necessary to consider the presence of common method bias. The Harman's single factor test was performed to assess the potential influence of common method bias (Podsakoff, 2003). The result showed that the total variance extracted by one factor was 43.65%, which was below the recommended threshold of 50%. Therefore, the common methods bias was not an issue for the data collected in the current study.

Results

First, to evaluate the validity of the measurement items and goodness of fit, confirmatory factor analysis (CFA) was performed. After this, the structural models formed in the current study were tested and compared from the statistics derived. The above-mentioned analyses were performed using IBM SPSS Amos 26.

Measurement model validation. Confirmatory analysis was conducted to evaluate model fits for each of the measurement items tested (see Table 2). The presented model indices in the following table indicated a good fit (Hu and Bentler, 1999). Furthermore, the computed composite reliability (CR) values were above 0.7, demonstrating the measurements to be reliable and appropriate (Hair et al., 2013). The average variance extracted (AVE) values were above the stipulated threshold of 0.5 (Hair et al., 1998), indicating good convergent validity.

Comparisons between AVE values and squared correlations are presented in Table 3. As AVE values were higher than the squared correlation values, discriminant validity was supported in the current dataset (Hair et al., 2013).

Hypothesis testing. Structural path analysis was then conducted to test the effectiveness of the proposed full model. As shown in Table 4, the model fit indices indicate a good fit for the proposed full model, fulfilling criteria including CFI > 0.90, TLI > 0.90, and RMSEA < 0.07 (Hu and Bentler, 1999).

Among the hypotheses that directly test continuous trust (H1-7), H3 (information quality—continuous trust) was rejected; direct influences from customer-related antecedents (H6: previous experience—continuous trust; and H7: propensity to trust—continuous trust) to continuous trust were not supported. However, H4 (organisation reputation—continuous trust) and H5 (customer support—continuous trust) were supported, indicating that effects from organisation reputation and customer support could also be mediated by privacy assurance and security features, as well as information quality. It should also be noted that though previous experience was not a direct predictor of continuous trust, the supported hypotheses H7a and H7c-e indicated the influence of previous experience on continuous trust to be moderated by several other factors of interest (e.g., perceived ease of use, organisation

Table 2 Confirmatory factor analysis results (N = 450).

	Mean	Standard deviation	Standardised factor loading	t-value	CR	AVE
PE1	3.90	1.09	0.82	***	0.89	0.72
PE2	3.98	0.85	0.87	14.16		
PE3	4.03	0.82	0.86	14.14		
PTT1	3.54	1.04	0.89	***	0.85	0.73
PTT2	2.84	1.10	0.82	19.68		
PEU1	3.83	0.87	0.83	***	0.89	0.66
PEU2	3.95	0.82	0.82	20.73		
PEU3	4.02	0.85	0.82	20.54		
PEU4	3.88	0.84	0.79	19.44		
PASF1	4.10	0.78	0.88	***	0.90	0.74
PASF2	4.06	0.85	0.83	22.24		
PASF3	4.15	0.77	0.87	24.25		
IQ1	4.09	0.81	0.78	***	0.90	0.64
IQ2	3.97	0.82	0.78	17.76		
IQ3	3.98	0.81	0.81	18.60		
IQ4	3.99	0.79	0.82	18.91		
IQ5	3.92	0.85	0.80	18.39		
OR1	3.92	0.87	0.76	***	0.80	0.57
OR2	4.23	0.76	0.78	16.62		
OR3	3.92	0.93	0.73	15.55		
CS1	3.95	0.84	0.78	***	0.87	0.62
CS2	3.96	0.85	0.74	16.61		
CS3	4.10	0.80	0.83	19.06		
CS4	4.12	0.78	0.79	18.08		
CT1	4.21	0.74	0.90	***	0.91	0.71
CT2	4.19	0.77	0.88	27.07		
CT3	4.08	0.86	0.70	17.96		
CT4	4.16	0.76	0.87	26.34		

Model fit indices: $\chi^2 = 666.77$; df = 322; χ^2/df = 2.07; IFI = 0.96; TLI = 0.96; CFI = 0.96; RMSEA = 0.05.
Degree of freedom $(df) = (i^2 + i)/2 - j$, for i equals the number of manifest variables and j equals the number of free parameters.
PE previous experience, PEU perceived ease of use, PASF privacy assurances and security features, IQ information quality, OR organisation reputation, CS customer support, CT continuous trust.
***Donates a constrained relationship to 1 for identification.

Table 3 AVE, construct correlation and squared correlation.

Factor	PE	PTT	PEU	PASF	IQ	OR	CS	CT
PE	0.72[a]	0.03[c]	0.18	0.10	0.10	0.11	0.11	0.08
PTT	0.17[b]	0.72	0.04	0.03	0.02	0.03	0.03	0.02
PEU	0.43	0.21	0.66	0.11	0.15	0.11	0.13	0.10
PASF	0.31	0.17	0.33	0.74	0.11	0.14	0.12	0.13
IQ	0.32	0.15	0.39	0.33	0.64	0.12	0.12	0.10
OR	0.33	0.17	0.33	0.37	0.35	0.57	0.14	0.14
CS	0.33	0.16	0.36	0.34	0.35	0.37	0.62	0.14
CT	0.28	0.14	0.32	0.36	0.32	0.38	0.37	0.71

PE previous experience, PEU perceived ease of use, PASF privacy assurances and security features, IQ information quality, OR organisation reputation, CS customer support, CT continuous trust.
[a]Average variance extracted (AVE) values are along the main diagonal.
[b]Correlations between constructs are below the main diagonal.
[c]Squared correlations between constructs are above the main diagonal.

reputation, and customer support). In addition, the influence of respondents' gender and age was also tested against the construct of continuous trust. The results did not reveal any significant relationships.

Reduced model. Considering not all hypotheses were supported in the full model, variables and links that did not yield significance in predicting continuous trust were removed to obtain a

Table 4 Path analysis of full model.

Full model

Hypothesis	Path	Std Coeff	P	Results
H1	PEU -> CT	0.203	0.042	Supported
H2	PASF -> CT	0.173	0.017	Supported
H3	IQ -> CT	−0.006	0.951	Rejected*
H4	OR -> CT	0.578	<0.001	Supported
H5	CS -> CT	0.595	<0.001	Supported
H6	PTT -> CT	−0.070	0.099	Rejected*
H7	PE -> CT	−0.085	0.121	Rejected*
H4a	OR -> PEU	0.100	0.209	Rejected*
H4b	OR -> PASF	0.579	<0.001	Supported
H4c	OR -> IQ	0.307	<0.001	Supported
H5a	CS -> PEU	0.023	0.240	Rejected*
H5b	CS -> PASF	0.259	0.001	Supported
H5c	CS -> IQ	0.283	<0.001	Supported
H7a	PE ->PEU	0.918	<0.001	Supported
H7b	PE -> PASF	0.049	0.681	Rejected*
H7c	PE -> IQ	0.380	<0.001	Supported
H7d	PE -> OR	0.824	<0.001	Supported
H7e	PE -> CS	0.828	<0.001	Supported

Explanatory power: $R^2_{CT} = 0.823$.
Model fit indices: $\chi^2 = 847.666$; df = 332; χ^2/df = 2.55; IFI = 0.943; TLI = 0.934; CFI = 0.942; RMSEA = 0.059.
PE previous experience, PEU perceived ease of use, PASF privacy assurances and security features, IQ information quality, OR organisation reputation, CS customer support, CT continuous trust.
*Hypothesis rejected on the confidence interval: $\alpha = 0.05$.

reduced model. The reduced model was then compared with the full model in their goodness of fit and explanatory power (R^2) regarding continuous trust and parsimony fit indices.

The comparison of two models typically involves the following three steps: (1) The model fit indices of each model are compared against the acceptance criteria; (2) If the survey data adequately fits both models, the explanatory power (in terms of R^2) of each model is then compared, with that of the greater value accepted (Huh et al., 2009; Rust et al., 1995); and (3) If both models are equivalent in goodness of fit and explanatory power, the more parsimonious model would be adopted.

The comparison results are listed in Table 5 below. In terms of model fit indices, both models demonstrated acceptable levels of fit to the collected survey data (Hu and Bentler, 1999). As the differences in model fit indices between the two models are negligible, their explanatory power (R^2) regarding continuous trust is compared. It is noted that with reduced variables and links, 81.8% of the variation in continuous trust was explained by the model, with a reduction of only 0.5% as compared to the full model. The major difference between the two models is in their parsimony fit indices (Akaike Information Criterion, AIC). A considerable amount of reduction in the AIC value of the reduced model (597.254 as compared to 995.666 in the full model) indicates that the reduced model is more parsimonious. The reduced model was hence selected as the more suitable model.

Results of the reduced model from path analysis are presented in Fig. 2. All hypotheses were supported at the significance level of $\alpha = 0.05$. These observations were similar to the full model. The personality trait of propensity to trust did not reflect customers' continuous trust. Similarly, information quality was not a strong predictor of trust in the continuous-use stage. Instead, other app-related variables (perceived ease of use, and

Table 5 Model comparison.

	χ^2	df	χ^2/df	IFI	TLI	CFI	RMSEA	AIC	R^2_{CT}
Full model	847.666	332	2.553	0.943	0.934	0.942	0.059	**995.666**	0.823
Reduced model	493.254	179	2.756	0.955	0.947	0.954	0.063	**597.254**	0.818

Bold values indicates the major difference between the full model and the reduced model.
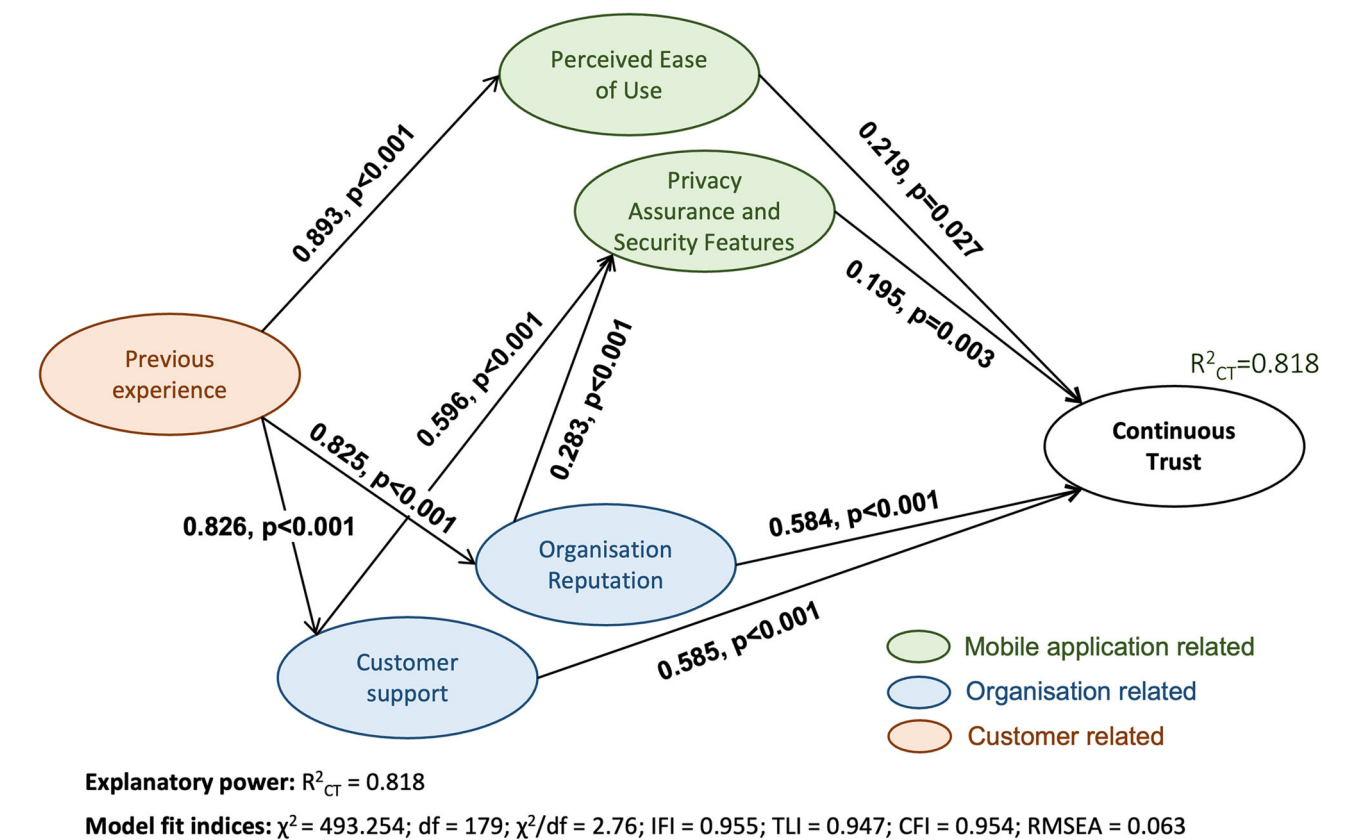

Explanatory power: $R^2_{CT} = 0.818$

Model fit indices: $\chi^2 = 493.254$; df = 179; $\chi^2/df = 2.76$; IFI = 0.955; TLI = 0.947; CFI = 0.954; RMSEA = 0.063

Fig. 2 Path analysis of reduced model for continuous trust of mobile banking. This figure shows the path analysis results from the reduced model.

privacy assurance and security features) and company-related variables (organisation reputation and customer support) were validated as direct antecedents to continuous trust. Some indirect effects were also observed in the model. Organisation reputation and customer support indirectly influence continuous trust as mediated by privacy assurance and security features. Further, previous experience did not directly inform continuous trust here. Its effects were mediated by perceived ease of use, organisation reputation, and customer support.

Discussion and conclusion
Continuous trust in mobile banking is predicted by three main sources—product or mobile app (perceived ease of use, privacy assurance and security features), organisation (reputation and customer support), and customers (previous experience). Perceived ease of use, organisational reputation and customer support are associated with previous experience. Privacy assurance and security features are predicted by organisational reputation and customer support.

Discussion on supported hypotheses
A model to predict customers' continuous trust after initial adoption of mobile banking. The current study shows its novelty

by integrating the potential influences of customers' perception of the company with their continuous trust of the app in our model. Furthermore, considering the potential influences of a customer's previous experience on the perception of mobile banking applications and associated organisations, effects from previous experience as mediated by other factors were also incorporated in this model. We found the overall indices of good fit for the full model and its reduced form to be generally robust. In both models, the majority of the variation in continuous trust could be well explained. As the reduced model yields similar performance as the full model, based on the parsimonious law, the reduced model is accepted for predicting customers' continuous trust by the constructs tested in the present study. This implies that while propensity to trust may not influence continuous trust in the continuous-use stage, an individual's previous experience shaped factors such as perceived ease of use, information quality, organisation reputation, and customer support—which then informed users' continuous trust levels. This is in line with findings from other studies on trust in mobile retailing apps and online banking (Kaushik et al., 2020; Zhou, 2012a). Furthermore, organisation reputation and customer support were found to have the strongest effects on strengthening customers' continuous trust. The finding is consistent with the study on corporation reputation by

Özkan et al. (2020). The two company-related factors could also influence how customers view the app's privacy assurances and security features. This is supported by another study on mobile wallet adoption, where Garrouch (2021) found that company reputation would impact the perceived security level of the app. The current study did not find any significant age effect on continuous trust. This finding is in line with our previous study (Zhou et al., 2021), where no significant difference was observed in satisfaction levels for customers under the age of 50. However, it was noted that customers over 50 years old had significantly higher satisfaction levels as compared to younger age groups. As the current study did not test participants over the age of 50, we could not conclude if there would be a significant transition in trust levels passing the age of 50. This age effect for older age groups can be further examined in future research.

Company-related perception influencing app-related perception. The current trust study adds novelty in understanding the relationship between organisation reputation and customer support on customers' perception of the mobile banking app. The reduced model revealed both organisation reputation and customer support to significantly influence customers' evaluations of both privacy assurance and security features, and information quality in mobile banking apps. This implies that high reputation and strong support from the banks are not only direct signals of trustworthiness but also indirect indicators of their apps' reliability and information quality as perceived by customers. This set of comprehension offers a new perspective on trust formation studies on mobile banking users. In future research that assesses continuous trust in relation to mobile banking app features, users' perceptions towards the bank should also be taken into consideration.

Customers' previous experience affecting their perception towards mobile banking apps and service-providing companies. Contributing new knowledge to the existing mobile banking trust studies, the current study proposed that in modelling customers' trust at a continuous-use stage, their perception towards the apps (perceived ease of use, privacy assurance and security features, and information quality) and service providing companies (organisation reputation, and customer support) would be readily influenced by their previous exposure to these services. Five out of the six proposed hypotheses (with the exception of previous experience—privacy assurance and security features) were supported through the validation of the reduced model with empirical data. This suggests past experiences with mobile banking significantly moderate present perceptions of mobile banking features, alluding to a reciprocal relationship. It is suggested that banks thus pay close attention to and even consider strengthening communicative relationships with their customers. This simultaneously allows for gaining first-hand, reliable insight into their individual experiences whilst providing enhanced quality service.

The absence of influences from propensity to trust, and information quality. The influence of customers' propensity to trust on continuous trust was not observed, though this has been supported in some studies of initial mobile banking trust (Kaushik et al., 2020; Zhou, 2012a). Propensity to trust indicates the degree to which trust might be assigned to a technology by customers given little prior experience or knowledge. This highlights the two distinct time points and stages of consumer trust, with a potential explanation for this difference being that at a continuous-use stage, customers have become relatively familiar with mobile banking through continuous usage, essentially nullifying the effects of an individual's propensity to trust, which may play a greater role at the initial adoption stage. In theory development, it indicates that the set of features influencing continuous trust is

different from features influencing initial trust formation, highlighting the necessity of extensive future research on the currently scarce continuous trust studies. On the other hand, information quality was found to have no significant influence on customers' trust here. A recent study conducted in Tunisia found similar results, arguing customers tended to prioritise and were primarily concerned with security and privacy features over information quality and aesthetics (Trabelsi-Zoghlami et al., 2020). This might indicate that information quality is not a major contributing factor in retaining users' trust over time, prompting a re-evaluation of features informing continuous trust.

Theoretical contribution. Our research contributes to the theoretical framework of studying mobile banking continuous trust by mobile app, organisation, and customer constructs (Beldad et al., 2010). The present study outlined factors influencing continuous trust in mobile banking, having highlighted constructs most relevant in predicting this relationship in the resulting reduced model. This indicates a few contributions to the existing literature. First, we have contributed towards the scant literature explicitly integrating concepts of continuous trust in mobile banking, particularly after initial adoption. Second, by adapting similar constructs of interest in trust of mobile banking for initial adoption, we invite comparisons between these two stages of consumer trust—before and after initial adoption. Third, the current model serves as a point of theoretical explanation for the complex, interrelated relationships of various facets of consumer trust and perception of mobile banking applications. Future research may consider developments such as investigating continuous trust across various time points of use and perhaps the inclusion of other constructs of interest such as temporal or environmental changes (e.g., before, during and post pandemic).

Practical implications. Findings from the current study may be informative to banks with regard to developing effective strategies for the long-term maintenance of existing customers' trust in mobile banking apps and thus customer loyalty. We further add to the discussion of designing user-friendly interfaces that might support functionality and user retention. The most important aspects (perceived ease of use, privacy assurance and security features, organisation reputation, and customer support) influencing customers' trust were successfully identified. In practice, customers generally appear to show more concern about the security features of the app to protect their personal information. This might only be expected to be more critical in mobile banking apps, which are directly linked to sensitive financial information. Enhancing this protection of customers' information and developing secure transaction processes are likely to reinforce trust and loyalty in mobile banking (Zhou et al., 2021). Perhaps equally important, the enhancements in customer protection and security need to be communicated to customers through push notifications or advertisement campaigns to strengthen their trust. Maintaining corporate image is also critical in retaining this trust, as highly regarded banks are perceived as more likely to treat their customers fairly and cater to their interests. It expects to build confidence in the use of these services. Furthermore, ensuring timely and reliable customer support is crucial. Responsive, timely, and helpful support from banks is critical for customers facing issues in the absence of physical interactions. Their experience with such online customer support might either greatly enhance or completely damage their trust in mobile banking, with effects potentially extending to the reputation of the banks themselves.

Limitations and future research. Varying cultural norms and values may differentially inform consumers' behaviour and perceptions across different markets. Hence the factors that are most influential in retaining Chinese customers' continuous trust in this

study might not necessarily be directly applicable in other markets. Additionally, due to limited resources and time, we were unable to include customers from small towns/rural areas (as opposed to major cities) in our study. This may affect the generalisability of our study to the entire community of Chinese mobile banking users. Next, actual behaviour has been argued on multiple occasions to be insufficiently predicted by questionnaire responses. Hence, the observed survey responses here may not be directly indicative of true long-term use. The relationship between continuous trust perceptions and actual intention or behaviour should be further studied through objective means. Lastly, though the proposed constructs suitably informed our proposed model, the constructs tested were mainly constructs of interest. Though these are informative for future development strategies, we note other factors not tested may also have significant effects in the consideration of theoretical applications. These limitations shall be addressed in future research. For our model to more accurately predict mobile banking users' real-world behaviour, clearly defined demographics should be targeted, and observations on their actual mobile banking usage should be made in the next stage while exploring other novel factors that could potentially influence their experience and usage.

Summary. The study's main findings revolve around three primary sources that predict continuous trust in mobile banking: the app itself (perceived ease of use, privacy assurance, security features), the organisation behind it (reputation, customer support), and customers' prior experience. The current study introduces a novel perspective by demonstrating the interplay between organisation reputation and customer support and users' perceptions of the mobile banking app. Propensity to trust did not significantly impact continuous trust, highlighting a shift in trust dynamics over time. The limited influence of information quality prompts a re-evaluation of its role in continuous trust formation. Our theoretical contributions encompass the integration of continuous trust concepts, comparisons between pre- and post-adoption trust, and a validated model informing trust. Practical implications include emphasising security, maintaining a positive corporate image, and ensuring responsive customer support.

Data availability
The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

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Author contributions

MC: Design of the work, analysis, interpretation of data, and drafting of the work. SYAS: Design and drafting of the work. HY: Conception and design of the work. QZ: Analysis and interpretation of data. JS, WS, and XL: Acquisition and preliminary analysis of data. HX: Conception and design of the work, interpretation of data, and substantive revision of the work.

Competing interests

The authors declare no competing interests.

Ethical approval

The questionnaire and methodology for this study were approved by Nanyang Technological University Institutional Review Board (IRB reference number: IRB-2021-305).

Informed consent

Informed consent was obtained from all participants and/or their legal guardians.

Additional information

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