Sacrifice elements in intention to adopt airline crisis communication with mobile apps

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Abstract

This research examines the impact of the determinants of perceived value and intention to adopt mobile applications for airline crisis communication. Value-based adoption model and prospect and mental accounting theories underpin the proposed research model. The findings obtained from structural equation modeling show that airline passengers assign a large weight to the benefits of such apps, namely, usefulness of location-based messages and usefulness of customized-need messages, with an emphasis on the former. Conversely, sacrifice elements are considered negligible. The factors affecting the intention to adopt airline mobile applications during crises are validated theoretically. Suggestions for desired airline mobile application features are also discussed.

Keywords: value-based adoption model, crisis communication, mobile application, political crisis

Introduction

The economic development created by the growth of the tourism industry can be interrupted and limited by crises and disasters (Senbeto & Hon, 2020). Strategic crisis communication is a vital aspect of tourism crisis management (Park, Kim, & Choi, 2018) and disaster response processes (Sadri, Hasan, Ukkusuri, & Cebrian, 2018) for handling crises and disasters. Accordingly, the airline industry has undertaken such activities as launching the latest official manual on crisis communication and reputation management in the digital age (International Air Transport Association [IATA], 2020).

Among the various possible crisis channels in offline and online communication, communicating via mobile apps has the most potential. Mobile devices and tourism-related mobile apps can inform, contextualize, personalize, and manage information (Benckendorff, Xiang, & Sheldon, 2019). Further supporting capabilities include ubiquity (Barnes, Pressey, & Scornavacca, 2019) and dissemination of information, knowledge, and practices (Fairburn & Patel, 2017). With such capabilities, airlines could use mobile apps to fulfill effective crisis communication characteristics, such as "respond quickly" to the numerous recipients (dissemination and informing capabilities) who are traveling (ubiquity capability) and select the information relevant to each recipient (managing capability) on the basis of their location (contextualization capability) and preferences (personalization capability) to "do anything to protect victims of any sort" (Avraham & Ketter, 2008; Coombs, 2014; Mackey, 2015).

Communication in natural crises used to be centralized and conducted in one direction, from senders to recipients, through traditional communication channels (Alfonso & Suzanne, 2008). By contrast, mobile apps functioning in crises can enable a large variety of communication patterns, including one-to-one, one-to-many, many-to-one, subsequently leading

to more user information and interactions (Tan, Prasanna, Stock, Hudson-Doyle, Leonard, & Johnston, 2017).

The airline industry has attempted to satisfy a growing need from travelers for mobile devices during their travel through the various functions of mobile apps that provide up-to-date information about the trips (Gheorghe, 2013), tailor the passenger experience (Munneke, 2014), enable check-ins and purchase of additional services (Szymczak, 2018), create boarding passes, and allow passport and credit card scanning (Perro, 2017). Personally controlling the travel experience can also be efficiently responded to through the apps running on smartphones (IATA, 2017), capability that has never been achieved through older technologies adopted by the airline industry.

The vulnerability of the airline industry to crises, high potential of mobile apps as communication channels in times of crisis, and current adoption of mobile apps in the airline industry suggest that crisis communication via mobile apps should be widely adopted by the airlines. However, airlines' use of mobile apps for crisis communication has not been well explored.

Recent studies on mobile apps have explored certain topics, such as specific software and mobile apps (Hsu & Lin, 2015; Liu, Zhao, Chau, & Tang, 2015), mobile banking (Al-Jabri & Sohail, 2012), apps for mobile commerce and related activities (Kerviler, Demoulin, & Zidda, 2016), and mobile apps for the hospitality industry (Kwon, Bae, & Blum, 2013). However, none of these studies has investigated the use of mobile apps during crisis situations.

Likewise, little knowledge is available on how mobile apps can enhance crisis communication within the airline industry. To date, the use of traditional media and websites has been seen in case-based approaches (e.g., Park et al., 2018; Yan & Kim, 2015) that could cause

the generalizability limit (Bryman, 2003). To overcome the limitation of case-based research, the current empirical study was conducted to provide generalizable findings on the perceptions of airline crisis communication recipients. The research objectives for this study are to 1) identify the determinants of passengers' intention to adopt mobile apps for crisis communication with the airlines and 2) develop and validate a new research model in the context of airline crisis communication by using a mobile app.

The researchers adopted the value-based adoption model (VAM) of Kim, Chan, and Gupta (2007) as a base model. VAM can predict a dual-role adopter's (i.e., technology user and customer) adoption intention that matches the dual role of airline passengers (i.e., airline customers and mobile app users). Two behavioral economics theories, prospect theory (Kahneman & Tversky, 1979) and mental accounting theory (Thaler, 2008), underpin this research model to increase the capability of predicting the behavioral intention of dual-role adopters. These adopters can decide whether to use the technology by themselves according to their perceived gains and losses.

The theoretical contribution of this study is in expanding the limited body of available knowledge relating to airline crisis communication via mobile apps. Furthermore, our research model, which is customized from VAM and the prospect and mental accounting theories, proposes a set of determinants that influence adoption intention. For practical contributions, the guidelines can be given to airline companies that are preparing for crisis communication during political crises.

Literature review

Crisis communication

By definition, crisis communication or crisis public relations refers to "a process that organi[z]ations employ to manage risk and instances of crisis" (Mackey, 2015, p. 12). This process is performed during pre-crisis, crisis response, and post-crisis periods through constant public communication (Avraham & Ketter, 2008). In other words, crisis communication is the reverse aspect of public relations because it attempts to prevent negative media feedback from happening (Coombs, 2010). The role of crisis communication equates with managing the risk and occurrence of crises (Mackey, 2015), thereby lessening the damage that crises impose on organizations and their stakeholders (Coombs, 2014).

Numerous scholars have proposed the characteristics of effective crisis communication. First, "responding quickly" refers to enabling information delivery to the stakeholders at the same speed as other information sources, especially in the present time when online channels are globally spreading crisis information (Coombs, 2014). "Consistency" means that the stakeholders receive consistent unified messages from all official spokespersons, and "openness" is the willingness of organizations to reveal information and honesty to the media (Coombs, 2014). "Expressing sympathy" to victims is required in a crisis (Coombs, 2014). Lastly, "do[ing] anything to protect victims of any sort" includes protecting the victims' physical and emotional well-being (Avraham & Ketter, 2008; Mackey, 2015).

Case studies on crisis communication have been extensively conducted in the past, and the trend has shifted to experiments aiming to understand systematically people's perceptions toward crisis response strategies (Coombs & Holladay, 2008; 2009; Dean, 2004; Schultz, Utz, & Göritz, 2011). However, these studies found that airlines are lagging behind the aforementioned

recent trend of crisis communication research. Numerous studies focusing on the airline context continued to focus on crisis response strategies adopted in single or multiple cases that share a common crisis theme, such as the 9/11 attacks (Downing, 2007; Greer & Moreland, 2003; Massey, 2005; Strother, 2004), airplane crashes (Haruta & Hallahan, 2003; Kim & Park, 2017; Yan & Kim, 2015), strikes (Cowden & Sellnow, 2002), overbooking crisis (Ma, Tse, Wang, & Zhang, 2019), disappearing airplanes (Ahmad, Ashari, & Samani, 2017), air rage incidents (Ho, Shin, & Pang, 2017), multiple airline crises (Arokiasamy, Kwaider, Balaraman, 2019), and airline employee communications (Langer & Thorup, 2006). When the case-based approach was mainly adopted, a theoretical comprehension of crisis communication (Dean, 2004) and a generalizability of results (Bryman, 2003) could be limited.

In consideration of the crisis communication channels, the aforementioned studies employed traditional media, such as newspaper, television, radio (Massey, 2005; Strother, 2004; Yan & Kim, 2015), and corporate documents (Downing, 2004; Langer & Thorup, 2006). Online media, such as websites (Greer & Moreland, 2003), corporate internal electronic publications (Downing, 2007), e-mails (Massey, 2005), and social media (Ahmad et al., 2017; Arokiasamy et al., 2019; Ho et al., 2017; Kim & Park, 2017; Ma et al., 2019), were also adopted.

Although the adoption of mobile apps as a means of crisis communication has been rare in the airline industry, the use of mobile apps during crises in general is evident. Tan et al. (2017) reviewed academic articles and identified two categories of mobile apps utilized in disaster situations. The first category, general-purpose apps such as social media, can support communication and disseminate information during non-crisis and crisis situations. The second, built-for-disaster purpose apps can fulfill five purposes, namely, crowdsourcing, collaboration, alerts and information dissemination, information collation, and user-generated notifications.

Certain mobile emergency notification apps launched to aid in crisis communication also allow users to share their context-based information to relevant stakeholders in emergency situations, such as Safety GPS, HelpBridge, Motorola Alert, EmergencyAlert, FEMA app, SignAlert, ELERTS, and My112 (Romano, Onorati, Aedo, Diaz, & Senesky, 2016). In tourism, the use of mobile navigation apps can provide safety-related information to tourists in unfamiliar places (e.g., information regarding emergency services near their current location). In addition, such apps can enhance safety in an emergency (Wang & Fesenmaier, 2013) that can develop into a crisis (Glaesser, 2006).

Prospect theory and mental accounting theory

Two behavioral economics theories, namely, prospect theory (Kahneman & Tversky, 1979) and mental accounting theory (Thaler, 2008), attempt to identify "value" in terms of its function and elements. Proposed by Kahneman and Tversky (1979), prospect theory presents the value function as the outcome of gains and losses (difference from one's current assets) rather than the final states of wealth or welfare. Second, the value function is generally concave for gains and convex for losses. Furthermore, according to Galanter and Pliner (as cited in Kahneman & Tversky, 1979), people perceive losses to be greater than gains, meaning that when an amount of money is lost, the aggravation derived from such loss seems higher than the pleasure of receiving the same amount of money.

The single, unidimensional outcome of value suggested in prospect theory was further extended to compound outcomes comprising multiple gains and/or losses, as found in mental accounting theory (Thaler, 2008). According to mental accounting theory, consumers perceive higher value when segregating 1) multiple gains or 2) "silver linings" (a small reduction in a

large loss created by smaller gains). Likewise, it is suggested to 1) integrate multiple losses into a single loss or 2) put large gains and smaller losses together.

Value-based Adoption Model

Kim et al. (2007) agreed that value plays a major role in affecting behavioral intention and developed the VAM based on prospect theory (Kahneman & Tversky, 1979). VAM is based on the belief that perceived value is the net gain derived from comparing the perceived benefits received and sacrifices incurred by users. Thus, perceived benefits positively affect the perceived value, whereas perceived sacrifices cause negative impact. In VAM, the benefits associated with using the mobile Internet (M-Internet) include usefulness (extrinsic and cognitive benefits derived from system use, task achievement, and product quality) and enjoyment (intrinsic and affective benefits, such as pleasure, joy, and fun in using the system). The sacrifices are composed of fees and technicality. VAM demonstrates that the perceived value function is a positive predictor of the adoption intention.

Gaps in the literature relating to VAM

VAM was presented in 2007. To date, the model has been adopted in various contexts of recent mobile or online services (e.g., Chen, Hsiao, & Wu, 2018; Hasan Lowe, & Petrovici, 2019; Hsiao & Chen, 2017; Hsu & Lin, 2018; Jun, Cho, & Park, 2018; Kim, Park, & Choi, 2017; Kim, Bae, & Jeon, 2019; Wang, Lin, Wang, Shih, & Wang, 2017; Wang, Wang, Lin, & Tsai, 2019; Yu, Seo, & Choi, 2019). Although various mobile or online technologies have been tested with VAM, studies with VAM in times of crises are lacking. Therefore, the argument that VAM has been adopted for crisis communication using mobile apps remains questionable. The rare cases of VAM adoption are inconsistent in proving the potential of VAM in examining the

determinants of intention to adopt mobile app technologies, especially during crises in which the technology could enable informative, contextualized, and personalized communication (Benckendorff et al., 2019). However, as the potential to examine technology adoption intention has rarely been provided in other theoretical models in crisis communication, adopting VAM in this context is suitable.

The majority of existing studies agree that utilitarian or extrinsic benefits are benefit elements. For example, "usefulness," which was originally proposed by VAM, is tested as a benefit element positively affecting perceived value (Chen et al., 2018; Hsu & Lin, 2018; Kerviler et al., 2016; Kim et al., 2019; Seyal, Ibrahim, & Rahman, 2014; Wang, Yeh, & Liao, 2013; Zhao, Su, & Hua, 2016). The utilitarian benefit elements relating to information content, namely, information reliability (Chung & Koo, 2015), perceived content (Hsiao & Chen, 2017), and content richness (Lin, Wu, Hsu, & Chou, 2012), have been proposed. Other forms of utilitarian benefits, such as personalization, value-added services, content richness, high quality (Lin et al., 2012), responsiveness (Zhao et al., 2016), compatibility (Jun et al., 2018; Wang et al., 2017), and relative advantage (Wang et al., 2017), have also been presented. Additional types of benefit elements referring to intrinsic or psychological benefits, such as enjoyment (Chung & Koo, 2015), hedonic benefit (Kerviler et al., 2016), and interesting (Zhao et al., 2016), have been suggested in VAM-related studies.

Assimilating the original VAM, prices, technicality, and other comparable costs have been included in various studies (Chung & Koo, 2015; Hsiao & Chen, 2017; Kim, Chun, & Lee, 2014; Lin et al., 2012). Emerging nonmonetary sacrifice elements, such as privacy (Chen et al., 2018; Kim et al., 2019), financial risks (Kerviler et al., 2016), changes in habit, and knowledge

of alternatives (Lin et al., 2012), were raised to match the characteristics of each technology examined.

The trend of identifying the benefit elements has led researchers to follow the original VAM by adopting the concepts of extrinsic and intrinsic benefits, perceived fee, and technicality. However, the types of benefits and sacrifices shown in the original VAM have been modified to specific benefit elements to suit the changes in each research context and technology. The adjustment has been split into two directions according to the dependent variables employed in the studies on VAM. First, the two main dependent variables, perceived value and adoption intention (behavioral intention), remain, as previously suggested in VAM. In this case, however, perceived value is mediated between benefits/sacrifices, and behavioral intention/behavior in diverse studies (Table 1). Second, perceived value is excluded from the model, and behavioral intention is directly affected by benefits and sacrifices (Kerviler et al., 2016; Wang et al., 2019). As previously described, adjusting the determinants that influence technology adoption of dual-role adopters (customers and technology users) is an ongoing process as the new technology and context are studied. Hence, determinants that emerge in the specific context of airline crisis communication via mobile apps should be adjusted and tested.

Hypotheses

Benefits

Usefulness of location-based messages and usefulness of customized-need messages. According to the definitions proposed by Davis (1989) and Kim et al. (2007), usefulness relates to a person's assessment of improved job performance. Adams, Nelson, and Todd (1992) define information usefulness as the extent to which useful content is offered through online information.

Given that crisis communication is the focal point of this research, usefulness in this case is information usefulness rather than other aspects.

Considering the possible information that can be achieved through airline crisis communication using a mobile app, location-based and customized-need messages certainly have "usefulness." The features of mobile apps facilitate the delivery of location-based and customized-need messages. Location-based services supported by Global Positioning System (GPS), Wireless Fidelity (Wi-Fi), or Bluetooth Low Energy (BLE) enable mobile apps to filter information and provide only the ones that are relevant and context-based (Benkendorff et al., 2019).

Mobile devices (in which mobile apps operate) possess functions that can deliver information personalized to each user's need by collecting data from contextual sensors, data stored on mobile devices, search histories, and device habits (Benkendorff et al., 2019). In addition, mobile apps allow consumers to co-create their experience, which provides added value in terms of personalized services (Buhalis & Sinarta, 2019). Mobile apps launched by tourism and hospitality companies have features that provide location-based and customized-need services, such as listed information of offers nearby, and the means for each customer's search to be customized as aided by the design of multiple filters (Wang & Xiang, 2012).

With location-based and customized-need messages, information matching the location and preferences of each passenger can be delivered during any crisis. Thus, the usefulness of location-based messages and the usefulness of customized-need messages constitute the benefit element of airline crisis communication via a mobile app. For example, airline passengers perceive one location-based service that shows the shortest route to the departure gate as the top-ranked benefit gained from mobile app usage (Szymczak, 2018). Consumers also consider customized services as another benefit of mobile app usage (Dorcic, Komsic, & Markovic, 2019).

Perceived value of airline crisis communication using a mobile app. Perceived value takes place when a user assesses the trade-off between perceived benefits and sacrifices (Chen & Dubinsky, 2003; Kim et al, 2007; Zeithaml, 1988). According to VAM, usefulness has a positive effect on perceived value (Kim et al., 2007). If a user benefits from location-centric, identifiability, and customization features, then the value of mobile service usage increases (Mahatanankoon, Wen, & Lim, 2005). The customer's perception of value can be increased by providing tailored services based on preferences (Lin et al., 2012). Providing location-based information and customized-need services for each consumer can result in added perceived value and is relevant when considering the developments in mobile commerce (Chunxiang, 2014; Liu et al., 2015). With support from previous studies conducted in the context of mobile services, the positive effects drawn from the benefits of location-based and customized-need messages to perceived value are assumed. Thus, H1 and H2 are presented.

H1: The usefulness of location-based messages has a positive impact on the perceived value of airline crisis communication using a mobile app.

H2: The usefulness of customized-need messages has a positive impact on the perceived value of airline crisis communication using a mobile app.

Sacrifices

Privacy concerns. Within the mobile environment, privacy concerns have recently emerged because of the vulnerability of users' personal information to hackers (Yang, Liu, Li, & Yu, 2015). This situation threatens users with being tracked, with their personal information collected, disclosed, transmitted, and sold (Chen & Kim, 2013; Liu et al., 2015; Yang et al., 2015).

In this research context, privacy concerns refer to users' concerns on the control over and the collection of their personal data, awareness of how their personal data are treated, unauthorized secondary use (Eastin, Brinson, Doorey, & Wilcox, 2016), access to their data (Lankton & Mcknight, 2011), and losing control of information caused by disclosing consumer preferences (Liu et al., 2015), locations (Eastin et al., 2016; Liu et al., 2015), and user information (Zhou & Li, 2014) to service providers.

With tourism and hospitality mobile apps, the personal information of consumers is collected to provide personalized services; thus, consumers unconsciously compare the risks to their privacy with the benefits of using mobile apps (Dorcic et al., 2019). In the context of mobile apps offering hotel booking services, customers have expressed high privacy concerns because of the various personalized services offered via the apps (Ozturk, Nusair, Okumus, & Singh, 2017).

Certain scholars have suggested that privacy concerns negatively impact the perceived value of mobile technology. For example, perceived privacy risk caused by disclosing preferences and locations negatively affects the perceived value of mobile coupons (Liu et al., 2015) and of Internet of Things services (Hsu & Lin, 2018). The perceived value of mobile channel usage (Kleijnen, De Ruyter, & Wetzels, 2007) and online to offline accommodation app services (Kim et al., 2019) tend to drop off if users have high privacy concerns. However, perceived security (privacy) (Wang, 2014) and trust in security (Sim & Kim, 2013) positively affect the perceived value of mobile technology for continued government use and mobile office services, respectively. With support from previous studies relating to mobile technologies, H3 is presented.

H3: Privacy concerns negatively affect the perceived value of airline crisis communication using a mobile app.

Technicality issues. "Technicality" is defined as "the degree to which the M-Internet is perceived [as] being technically excellent in the process of providing services" (Kim et al., 2007, p.116). However, the issues of technicality can negatively affect the perceived value of the M-Internet (Kim et al., 2007), mobile commerce (Chunxiang, 2014), and GPS navigation apps (Wang et al., 2017). These issues include performance risk (Yang et al., 2015), perceived effort and complexity (Chung & Koo, 2015), cognitive effort (Kleijnen et al., 2007), and complexity (Wang et al., 2017). By contrast, "technicality" (provision of services that are technically excellent [Kim et al., 2007]) is claimed to impact positively on the perceived value of online to offline accommodation app services (Kim et al., 2019). Airline crisis communication using mobile apps has issues in three aspects of technicality from M-Internet that are presumed to negatively affect perceived value especially in a crisis where system stability and survival could be threatened (Seeger, Sellnow, & Ulmer, 2003). These aspects include ease of use (free of physical and mental effort), reliability (stability), and efficiency (requiring a short time to process) (Kim et al., 2007). Thus, H4 is presented.

H4: Technicality issues exert negative effects on the perceived value of airline crisis communication using a mobile app.

Intention to adopt airline crisis communication using a mobile app. Adoption intention, as originally described in the definition of behavioral intention, is "a person's subjective probability that he will perform some behavior" (Fishbein & Ajzen, 1975, p. 288). In many recent mobile-related studies, adoption intention is positively affected by perceived value (e.g., Chunxiang, 2014; Hasan et al., 2019; Hsu & Lin, 2018; Jun et al., 2018; Kim et al., 2014; Kim et

al., 2017; Kim et al., 2019; Seyal et al., 2014; Wang et al., 2017). Additional evidence derived from the relevant context of location-based mobile services support that convenience value (value gained from the derivation of information-based services, such as location-based search services) has a positive effect on behavioral intention (Pura, 2005). In the same vein, if any tourism and hospitality mobile apps do not create any value-added to the decision-making process of customers, then such apps tend not to be preferred (Wang & Xiang, 2012). Thus, H5 is hypothesized with support from previous works conducted in the context of mobile services:

H5. The perceived value of airline crisis communication using a mobile app positively impacts the intention to adopt airline crisis communication using a mobile app.

As mentioned in all previous hypotheses, perceived value is deemed to be influenced by the four benefit and sacrifice elements, which affect adoption intention. Thus, in the current research model, perceived value is expected to play a significant role as a mediator in the relationship between each benefit/sacrifice element and adoption intention. Hence, H6a, H6b, H6c, and H6d are formed:

H6a. The perceived value of airline crisis communication using a mobile app mediates the relationship between the usefulness of location-based messages and the intention to adopt airline crisis communication using a mobile app.

H6b. The perceived value of airline crisis communication using a mobile app mediates the relationship between the usefulness of customized-need messages and the intention to adopt airline crisis communication using a mobile app.

H6c. The perceived value of airline crisis communication using a mobile app mediates the relationship between privacy concerns and the intention to adopt airline crisis communication using a mobile app.

H6d. The perceived value of airline crisis communication using a mobile app mediates the relationship between technicality issues and the intention to adopt airline crisis communication using a mobile app.

To further clarify all the hypotheses mentioned above, the definitions of all variables are provided in Table 2 along with their supporting literature.

[Table 2 near here]

Proposed research model

The proposed research model adopts prospect theory in the sense that the value is formed by considering gains and losses (Kahneman & Tversky, 1979). Following this aspect of prospect theory, value is placed as a result of the benefit (gains) and sacrifice (losses) elements in the proposed research model. Hence, the perceived value construct is a dependent variable positively affected by the benefit elements and negatively impacted by the sacrifice elements.

Mental accounting theory, which states that the value can be compound outcomes composed of multiple gains and/or multiple losses, also underpins the current research model. The proposed research model is underpinned by mental accounting theory in the sense that the benefit elements (gains) and the sacrifice elements (losses) are presented in multiple forms. This feature leads to the proposition of multiple gains in the forms of usefulness of location-based messages and usefulness of customized-need messages, as well as of multiple losses in the form of privacy concerns and technicality issues.

Moreover, VAM serves as a foundation for the current research model in the sense that the positive impact of benefits and the negative impact of sacrifices lead to adoption intention via perceived value. In the current research model, a newly proposed set of variables includes the

usefulness of location-based messages, the usefulness of customized-need messages and privacy concerns, whereas technicality issues, perceived value, and adoption intention variables remain constant. Perceived fee is excluded because free usage of the airline mobile app is usual, and a fixed Internet is provided to customers as a fee-less service (Liljander et al., 2007). Figure 1 demonstrates the research model.

[Figure 1 near here]

Methodology

Study setting

A suitable crisis scenario needs to be formed because this study focuses on a crisis faced by airlines that could occur at any location. The main crisis scenario in this study is political rather than other types of crises as it extends not only to the West but also across the world (World Economic Forum, 2017). Damage due to a political crisis has occurred at different airports and affected numerous airline passengers (Al Jazeera, 2017; Batchelor, 2017; Queally, Panzar, & Hamilton, 2017). A scenario of a political crisis has been selected, also based on the assumption of an intentionally man-made crisis that is forgotten more slowly than a crisis caused by nature (Tarlow, 2014). In addition, the public fixes the blame on relevant stakeholders (Birkland, 1997). Hence, the impact of a political crisis could last long, become sufficiently severe compared to a natural disaster, and should be well recognized by airlines.

Among airline passengers' destinations that are highly prone to political crises, Thailand is deemed a suitable study setting owing to its political instability from 2008 to 2010 and from 2013 to 2014. Such political instability was highly detrimental to the state of the country, as evidenced by international travel advisories (Horn, 2010; The Nation, 2014). Our survey focused

on international airline passengers in diverse locations who are qualified respondents and can be easily found. Two international airports in the northern and northeastern regions of Thailand, namely, Chiang Mai International Airport in Chiang Mai province and Khon Kean Airport in Khon Kean province, officially granted permission for the questionnaire distribution. The number of questionnaire sets collected were 97 and 73, respectively (170 sets in total). In the capital city of Thailand, Bangkok, 322 questionnaire sets were collected, 168 sets from the old town district and 154 sets from the downtown district of Silom Road. For the western and southern parts of Thailand, the questionnaire survey was conducted at the beach destinations of Prachuap Khiri Khan, Krabi, and Surat Thani provinces, with a collection of 32, 48, and 46 sets, respectively (126 sets in total). The researchers intentionally selected the research settings in different parts of Thailand to gather data from airline passengers with various travel purposes and lifestyles. The waiting areas in the research settings were carefully selected to encourage a high response rate. The total number of returned questionnaire sets was 618.

Instrument and measures

A quantitative research methodology was adopted for this study, following the survey research strategy of using a questionnaire. To create the questionnaire, a seven-point Likert-type scale was applied to measure each construct, following Kim et al. (2007). The multi-item measures were derived and adapted from previous literature (Tables 4 and 5). In addition, the description of the political crisis scenario was adapted from previous political crises that occurred in Thailand, and technical terms were provided.

To ensure content validity, all measurement items, crisis scenario, and descriptions of technical terms were reviewed, screened, and commented on by an expert panel of six academics and four practitioners. The panel members are all active in the areas of crisis management,

mobile technology, airline operations, and hospitality management. Table 4 shows the final list of items, and Appendix 1 presents the crisis scenarios and technical term descriptions. The pilot study's suggested number of 10% of the target sample size was adopted for the main data collection (Connelly, 2008; Treece & Treece, 1982). Sixty-three pilot questionnaires were distributed and collected, and the data were checked for construct reliability by using Cronbach's alpha coefficient (Churchill, 1991; DeVellis, 2003). Given that all measurement items yielded values exceeding the very good range of value (≥ 0.8) (DeVellis, 2003) in the pilot study's data analysis, all items were retained.

Survey and sampling procedures

The researchers used convenience sampling with a planned sample size of 600 to exceed the requirement for structural equation modeling (SEM) as suggested by Hair, Black, Babin, and Anderson (2014). To conduct the convenience sampling, the researcher approached possible respondents who were readily available at the selected site, including passengers who inadvertently arrived at the site (Leedy & Ormrod, 2013) or could easily be accessed (Salkind, 2010) within certain periods (Sarantakos, 1998). The sites were public spaces where potential respondents tended to appear (Kumar, 2014). In the current research, the two researchers and five research assistants invited airline passengers or tourists who congregated at the waiting areas of the study settings. The ones who accepted the invitation were then screened to ensure they were qualified as survey respondents. Screening questions were shown on the first page of the questionnaire: 1) "Have you ever traveled internationally by plane?" and 2) "Have you ever had experience in using mobile applications (any mobile application [app] which can be downloaded from Google Play Store or App Store, such as WhatsApp, LINE and WeChat)?" In this way,

qualified respondents who were airline passengers and had experience in using mobile apps were selected.

To access a large variety of respondents, the questionnaire, which had been designed using the English language, was translated by professional translators into Mandarin, Russian. and Thai. The languages facilitated a large number of potential respondents found at the study setting. The reason for this decision was that a large number of international tourists from mainland China, India, and Russia had been significantly targeted by the Tourism Authority of Thailand (Tourism Authority of Thailand [TAT], 2015) as "tourists with high potential." Thai language, which was a native language in the study setting, was selected to capture local airline passengers. The correctness of all translated questionnaires was validated by cross-checking the questionnaire content with Chinese, Russian, and Thai native researchers and research assistants.

The data collection period lasted for six months, from January to June 2018. Out of 700 sets of questionnaires distributed, 618 sets were returned, and 607 were deemed usable sets (86.71% response rate).

Data analysis and results

Profile of the respondents

Over half of the respondents were female (56.5%), and the largest group of respondents was aged between 20 and 30 years (62.1%). The respondents holding bachelor's degrees (30.6%) constituted the largest group proportionately. More respondents had a travel frequency of 1-2 times per year (33.4%) and had experience in using mobile apps for 5-6 years (35.3%). Most of the respondents acknowledged that they had never encountered a crisis. A total of 58 nationalities were recorded among the respondents (Table 3).

[Table 3 near here]

Measurement model

The researchers analyzed the reliability and validity by using the measurement model before performing path analysis via the structural model and following the guidelines of the two-step modeling approach (Anderson & Gerbing, 1988). The AMOS 23.0 program was adopted, and confirmatory factor analysis (CFA) was used to assess the validity of measured variables (Byrne, 2010; Hair et al., 2014).

The following goodness-of-fit measures were implemented: ratio of the chi-square ($\chi 2$) to the degree of freedom (*df*), comparative fit index (CFI), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normed fit index (NFI), root mean square error of approximation (RMSEA), Tucker–Lewis Index (TLI), and standardized root mean square residual (SRMR). The results indicated a good fit between the data and the model, given that all of the values generated ($\chi 2/df = 3.773$, CFI = 0.932, GFI = 0.841, AGFI = 0.810, NFI = 0.910, RMSEA = 0.068, TLI = 0.923, SRMR = 0.060) were compatible, following the suggested cut-off points of Wheaton, Muthén, Alwin, and Summers (1977) ($\chi 2/df < 5.0$); Hair et al. (2014) (CFI > 0.9, TLI > 0.9, SRMR ≤ 0.08); Doll, Xia, and Torkzadeh (1994) (GFI ≥ 0.8, AGFI ≥ 0.8); MacCallum, Browne, and Sugawara (1996) (RMSEA ≤ 0.08); and Hu and Bentler (1999) (NFI > 0.9).

To assess construct reliability, SPSS 23.0 was used to generate Cronbach's alpha coefficients that were between 0.849 and 0.950 (Table 5) and exceeded the cut-off point of DeVellis (2003). The construct reliability values were in the range of 0.849–0.951 and demonstrated good reliability at the cut-off point of 0.7 (Hair et al., 2014). Further convergent validity was gained from CFA. All standardized factor loadings and AVE calculated from each construct exceeded the cut-off point of 0.5 (Hair et al., 2014). For discriminant validity, all the

correlations between the two factors were less than 0.85, indicating that discriminant validity was not a problem (Kline, 2005) (Table 6). Finally, the square root of AVE that was larger than the correlations of a construct with other latent constructs showed that discriminant validity was achieved (Fornell & Larcker, 1981).

[Table 4 near here]

[Table 5 near here]

[Table 6 near here]

Test for bias

Common method bias was checked using Harman's single-factor test, as suggested by Podsakoff, Mackenzie, Lee, and Podsakoff (2003), to process all of the constructs' items in a principal component factor analysis (Ling & Greenley, 2005). The results showed that the first factor accounted for less than 50% (40.28%) and did not reveal common method bias (Mattila & Enz, 2002). The researchers decided to ignore non-response bias because the response rate calculated from the number of complete questionnaires (86.71%) was more than the suggested level (50%-85% response rate) needed to control non-response error (Dooley & Lindner, 2003).

Structural model and hypotheses testing

The structural equation model was tested using the maximum likelihood (ML) method of estimation. The structural model proposed was in the form of a path diagram derived from H1, H2, H3, H4, and H5. The value was estimated and assessed to determine compatibility with the theoretical expectation (Hair et al., 2014). All values of the model fit indices ($\chi 2/df = 3.847$, CFI = 0.929, GFI = 0.833, AGFI = 0.802, NFI = 0.907, RMSEA = 0.069, TLI = 0.921, SRMR =

0.067) showed that the overall model fit of the hypothesized model was acceptable because all values passed their cut-off points.

Considering the positive effect from the usefulness of location-based messages and the usefulness of customized-need messages on perceived value, H1 ($\beta_1 = 0.596$, $t = 9.489$, $p < 0.001$) and H2 were supported ($\beta_2 = 0.254$, $t = 4.399$, $p < 0.001$). Conversely, the results revealed that H3 ($\beta_3 = 0.019$, $t = 0.471$, $p = 0.638$) and H4 ($\beta_4 = 0.061$, $t = 1.426$, $p = 0.154$) were not supported because they did not confirm the negative causal link from privacy concerns and technicality issues to perceived value. The positive effect of perceived value on adoption intention or H5 ($\beta_5 = 0.800$, $t = 21.140$, $p < 0.001$) was supported (Figure 2 and Table 7).

The R^2 values for perceived value and the intention to adopt airline crisis communication using a mobile app were 69.6% and 64.0%, respectively. This result demonstrated that the above-cut-off point of 10% (Falk & Miller, 1992) of the total variance in these two dependent variables was explained by the independent variables.

[Figure 2 near here]

[Table 7 near here]

Test for mediation

H6a, H6b, H6c, and H6d were tested using the bootstrap estimation procedure in AMOS 23.0 program to test the significance of the mediating effect of perceived value. The bootstrap method is a suitable option for testing indirect effects because accurate confidence intervals for indirect effects can be generated (Mackinnon, Lockwood, & Williams, 2004). Furthermore, the bootstrap test is capable of yielding holistic results of the mediating effect (Zhao, Lynch, & Chen, 2010). A bootstrap test of the indirect effects was performed with a suggested bootstrap sample of 5,000 and a confidence level of 95% (Zhao et al., 2010). The results of the bootstrap

test confirmed "perceived value" as a mediator between the two benefit elements (i.e., the usefulness of location-based messages and the usefulness of customized-need messages). Table 7 illustrates that the two indirect effects, drawn from the two benefit elements (i.e., the usefulness of location-based messages and the usefulness of customized-need messages) to adoption intention via perceived value, were significant given that the value of zero did not fall between all the 95% confidence intervals (Preacher & Hayes, 2008). All direct effects from these two benefit elements to adoption intention were considered insignificant, as indicated by their 95% confidence intervals that overlapped with zero. Therefore, H6a and H6b were supported. However, H6c and H6d were not supported because the indirect effects, drawn from the two sacrifice elements (i.e., privacy concerns and technicality issues) to adoption intention via perceived value, were not significant. A significant positive effect was observed between technicality issues and adoption intention. This result was unexpected because the item was not hypothesized and did not have support from the literature. Table 8 illustrates the results of the test for mediation

[Table 8 near here]

Discussion

Managerial implications

First, considering the determinants of the intention to adopt airline crisis communication using a mobile app, the findings demonstrate that the usefulness of location-based messages and the usefulness of customized-need messages increase perceived value and leads to adoption intention. These findings support previous studies claiming that location-based and customized-need features positively affect perceived value in mobile service contexts (Chunxiang, 2014; Liu

et al., 2015; Mahatanankoon et al., 2005). The findings also imply that mobile apps can be employed as an airline's crisis communication tool. The reason is that high perceived value and adoption intention are gained from the existing capability of mobile apps to send location-based and customized-need messages, which cannot be provided at the same level of performance by other previous crisis communication tools adopted by airline companies. The offline communication channels (i.e., announcements, customer information centers, and human interaction with staff members) cannot automatically send both location-based and customized-need messages to each passenger because the process takes staff members time to gather the information manually. The wireless (short message service [SMS] sent via the passenger's phone number) and online communication channels (airline websites, e-mails, and social networking sites) can access a passenger's profile from the airline's database of passenger profiles or from their self-input personal data. However, the mobile apps are perceived as a superior option because they can search for the users' personal information from various sources of information stored in their mobile devices (Benckendorff et al., 2019) and in the mobile apps through their participation in loyalty member programs (Dickinson, Ghali, Cherrett, Speed, Davies, & Norgate, 2014). Moreover, location-based features of the aforementioned wireless and online communication channels can be considered inferior to the features of mobile apps. This finding is supported by the fact that the airline's or airport's apps provide real-time and relevant information based on the current location of the user (Benckendorff et al., 2019). Therefore, utilizing airline mobile apps with the functions of location-based and customized-need message delivery to conduct crisis communication is recommended to airline practitioners. The provision of location-based and customized-need messages is in line with IATA (2017), which requires airlines to invest in GPS (location-based supporting system) and customization. Hence, if airline

practitioners aim to increase the adoption intention of crisis communication via their mobile apps, then they should additionally implement the crisis communication app feature that selectively delivers messages based on the location and individual customized needs of airline passengers.

Conducting crisis communication via a mobile app with high perceived value could enable airlines to offer additional beneficial services, because this provision has not been widely implemented in airline mobile apps or acknowledged by the public. Being one of the pioneers in efficiently preparing for crises via existing mobile apps could positively influence airline passengers and the public, as proven by the high value perceived from its provision. This implication is supported by Grundy and Moxon (2013), who state that planning for crises even before they occur should be mandatory for organizations to reduce the damage done to the organizations' brands in times of crises.

Second, in the magnitude of their effects, the positive effect from the usefulness of location-based messages is larger than that from the usefulness of customized-need messages. Possibly, location-based features can provide safety as contextualized. Updated safety information generates emergency assistance (Pedrana, 2014) in unfamiliar tourist destinations (Wang & Fesenmaier, 2013). Romano et al. (2016) suggest that the location-based feature should be mandatory for mobile apps providing emergency notifications. The important aspects of effective crisis communication are "do[ing] anything to protect victims of any sort" (Avraham & Ketter, 2008; Coombs, 2014; Mackey, 2015) and providing information to protect themselves (Coombs, 2014). Therefore, location-based messages are ranked first. If the suggested priorities are ranked, then airline passengers will perceive and then adopt the maximum value from the airline crisis communication via a mobile app.

The suggestion is that the first priority of an airline crisis communication mobile app should be the capability of location-based messages to provide safety and security to all passengers equally, regardless of their customized needs. After everyone is protected, the next priority should be to enhance convenience through customized-need messages. Hence, the implementation of and investment in location-based messages should be mandatory for airlines aiming to conduct crisis communication via their mobile apps. Prioritizing the investment of the location-based message delivery system could enhance the quality of customized-need messages. This result can be attributed to the location-based services generated by various technologies, such as cell ID, angle of arrival, time of arrival, enhanced observed time difference, and GPS (Gartner, 2020a). On the contrary, customized-need messages require passengers to provide their information. Using technologies can overcome human errors in situation where incorrect, fake, or less-updated data are provided. Moreover, it is possible to extract other meaningful user behavior from location-based data (Zheng, Zheng, & Yang, 2009), a contextual sensor (Benkendorff et a., 2019) and a mobile app analytic (Gartner, 2020b). Thus, considerable information relating to a passenger's customized needs, which may otherwise be absent, could be obtained from investing in a mobile app equipped with location-based services and a mobile app analytic. The high potential of mobile app analytic is shown in its current usage in the airline industry. Various airlines have already exploited the mobile app analytic to track, store, and access passenger behavior throughout the trip to provide further relevant offers and highly tailored services (Hodgson & Waldmeir, 2018; Noyes, 2014). Similarly, Park et al. (2018) support that online data relating to the behavior of tourists should be utilized using analytic techniques to effectively manage crisis communication during any natural crisis in a tourist destination.

Third, apart from investing considerably in a location-based message-supporting system, the management of a customized-need message-supporting system is needed to enhance the completion and preciseness of passenger data. Airline practitioners should gather passenger data through various data collection processes, such as during purchasing, passenger information requests in membership registration, and surveys sent to passengers or airline members. Thus, the supporting systems for collecting actual location, profiles, and preference data of passengers, storing and illustrating the data, and linking with the airline mobile app need to be implemented.

As the findings demonstrate, the provision of location-based and customized-need messages could augment perceived value. Therefore, airline practitioners should communicate by giving their personal data to the airlines, for which airline passengers will receive two types of messages and details of the usefulness gained from such messages (e.g., safety, security, and convenience) during crises. Separately communicating the benefits of location-based and customized-need messages is highly recommended. This idea follows the proposition that customers prefer perceiving that they receive segregated gains, as stated in mental accounting theory (Thaler, 2008). This process could encourage airline passengers to willingly provide their data to airlines given the high perceived value of the usefulness of location-based messages and the usefulness of customized-need messages that could be expected in return. Alternatively, the usefulness of location-based messages and the usefulness of customized-need messages could be conveyed through various approaches, such as text instructions, video presentations, and augmented reality, all of which have previously been offered in airline mobile apps (e.g., Air New Zealand, 2018; American Airlines, 2012; Garcia, 2017; Singapore Airlines, 2017). This step could increase the level of passenger familiarity with the crisis communication feature, the usefulness of location-based messages, the usefulness of customized-need messages, and the

adoption intention starting from the normal operating times. Once a crisis occurs, the airline passengers who have already acknowledged the benefits of crisis communication features could easily adopt crisis communication via their airline mobile app.

Fourth, sacrifices, including privacy concerns and technicality issues, do not have any significant impact on perceived value. The findings do not support the negative impacts of either sacrifice element on perceived value, as raised in previous research, such as on mobile technology related to financial and work-related tasks (i.e., Kleijnen et al., 2007; Liu et al., 2015). By contrast, improved privacy security leads to higher perceived value (Awasthi & Sangle, 2013; Sim & Kim, 2013; Wang, 2014). This finding can be explained by non-crisis circumstances, like privacy infringements during financial or work-related tasks, which are so unacceptable such that users are reluctant to perceive the value of such technology. Nonetheless, in a crisis context, airline passengers do not ascribe much importance to their privacy. Therefore, the perceived value of adopting crisis communication using mobile apps is not negatively impacted. The assumption is that privacy concerns are not relevant in crisis situations, in which revealing one's personal data can help provide safety and security. This assumption corresponds with the work of Jia, Jia, Hsee, and Shiv (2017), who report that after users experience an earthquake, their functional and informational needs are fulfilled through increased mobile app usage.

For the technicality issues perceived in crisis situations, although our findings correspond with those of Wang et al. (2013), the results of technicality issues are incompatible with the original VAM and other studies on mobile technology (Chunxiang, 2014; Kleijnen et al., 2007; Yang, et al., 2015). In the current study, the consumers' insignificant concerns over technicality issues could be due to their high level of experience in using smartphones to search for online

information (Holton & Chyi, 2012) and their familiarity with mobile apps (Hsiao & Chen, 2017; Lella, 2017). Correspondingly, the insignificant effect drawn from technicality issues to perceived value is caused by the increase in the computer self-efficacy of consumers in the Internet era (Wang et al., 2013). Other aspects of technicality (i.e., reliability and efficiency) are assumed to be enhanced; thus, technicality problems can be reduced. Substantial time, money, and attention have recently been invested in mobile app development to engage and connect with customers (Accenture, 2015). Consumers who intend to use online brand microblogging services continuously are likely to pay less attention to a timely response, which is one of the technicality aspects, than to usefulness (Zhao et al., 2016).

Therefore, airline practitioners are advised that airline passengers overlook privacy concerns and technicality issues. Airline passengers can provide their personal information to the airline mobile app, accept the possible technicality issues of the app, and agree to use the app on the condition that they can access location-based and customized-need messages during a crisis. Communicating this benefit should be the responsibility of the airlines' public relations managers.

In summary, all the managerial implications discussed above could be applicable for all airlines operating in countries that are vulnerable to political crises. Although the study setting is in Thailand, the implications from this study could be applied to airlines operating in any country that is highly vulnerable to political crises and airlines that aim to prepare for conducting crisis communication in anticipation of political crises. Such applicability stems from the screened respondents, who are international air travelers originating from 58 different countries; featuring the common characteristics of general international airline passengers, regardless of the airports or destinations visited. This condition allows for a generalization of our research implications.

Theoretical implications

Our research yields theoretical implications for the literature on adopting technology, especially in airline crisis communication via an understudied mobile app. First, knowledge about the determinants of adoption intention in this research context could be expanded. The findings confirm that various determinants affect the evaluation and adoption of mobile technology (Sim & Kim, 2013), thus the need to consider context-dependent factors (Campbell & Goodstein, 2001; Yang et al., 2015) is essential. Adjustment of determinants affecting the behavioral intention is necessary in each specific context to respond to ever-changing customer behavior in adopting new technologies, as observed in the determinant adjustment conducted in the previous VAM and its descendants in various mobile and online service contexts (Table 1).

A unique set of determinants of adoption intention is proposed on the basis of our context-based research model and is partially different from the original VAM. Although perceived value and adoption intention remain the same, certain unfit determinants, namely, "enjoyment" and "perceived fee," are excluded due to the nature of crises generating negative feelings, free Internet access (Konrad, 2014), and provision of free airline mobile apps (Liljander et al., 2007). In terms of usefulness, original (Davis, 1989) and information usefulness (Adams et al., 1992) are ramified to the usefulness of location-based messages and the usefulness of customized-need messages and tested to yield significant effects on the perceived value. These findings partially support mental accounting theory in terms of multiple gains affecting decisions (Thaler, 2008). Such multiple gains are represented by the usefulness of location-based messages and the usefulness of customized-need messages. According to the findings, their relative importance differs because the usefulness of location-based messages creates a larger effect than the usefulness of customized-need messages. However, these findings are not fully in line with

mental accounting theory (Thaler, 2008). In this research, multiple losses are adopted from the original VAM and previous studies related to mobile technology adoption to efficiently match the technological features of mobile apps, including technicality issues with certain adjustment and privacy concerns. However, all these losses are confirmed as insignificant predictors of perceived value in this research context.

Second, this research validates the application of theoretical concepts derived from information systems (VAM) and behavioral economics disciplines (prospect and mental accounting theories) in the context of hospitality, in which the theoretical foundation and research for benefit and sacrifice elements of value are lacking (Chung & Koo, 2015). The combination of the three theories is adopted from Chung and Koo (2015), Gupta and Kim (2010), and Kim et al. (2007). Although a new theoretical combination could not be proposed, a set of new determinants has been raised and validated by the current research model, providing additional evidence to support the validity of combining the concepts from the three theories. Even though sacrifices are considered negligible, confirmation of the positive effects of the benefits and the mediating role of perceived value partially corresponds with the concepts of the value function identified by gains and losses, as raised in prospect theory (Kahneman & Tversky, 1979). Mental accounting theory (Thaler, 2008) is partially supported in the sense that multiple gains (benefit elements) form the compound outcomes of value. Mental accounting theory's proposition of higher value, driven by the segregation of gains (Thaler, 2008), is also confirmed in the current research model. The provision of two separated benefits of location-based and customized-need messages creates higher perceived value.

The current research model, which is meticulously formed and empirically validated, could provide a generalizable research model that suggests the determinants affecting the

adoption intention of an airline mobile app as a crisis communication tool. Thus, the current research model, which yields systematic understanding of the perceptions of airline passengers across various political crises, could overcome the generalizability limit of the case-based approach (Bryman, 2003), which has been intensively implemented in airline crisis communication. In addition, the literature on airline crisis communication that has emphasized the response strategies could be expanded in terms of the types of crisis-related messages (location-based and customized-need messages) preferred by airline passengers via mobile apps.

Third, apart from crisis communication, the information system field could benefit from this research. Valid applications of VAM in airline crises could be added to technology adoption knowledge, especially in cases of dual-role adopters. Following VAM and its descendants (Table 1), this research highlights that the value mediates the relationship between the two benefit elements (i.e., the usefulness of location-based messages and the usefulness of customized-need messages) and the adoption intention, as perceived by dual-role customers in a crisis communication mobile app, which is not a core product of the airlines. The important role of perceived value corresponds to the notion of including the perceived value in model testing, when air travelers are ready to adopt the airlines' mobile apps across the airline travel activity chain (Lubbe & Lauw, 2010). In this research context, the dual role (customer and technology user) emphasizes perceived value in the decision-making process of customers. Mobile apps are pull-based (Persaud & Azhar, 2012) and selectively adopted by users on the basis of their needs and interests (Verkasalo, López-Nicolás, Molina-Castillo, & Bouwman, 2010). Hence, users are free to decide whether to adopt them. This condition is different from a workplace context, in which users have minimal freedom to adopt technology, and perceived value is excluded, such as in the technology acceptance model of Davis (1989) and unified theory of acceptance and use of

technology of Venkatesh, Morris, Davis, and Davis (2003). When deciding whether to adopt any service, the customers evaluate the benefits and sacrifices in terms of the overall value gained rather than solely considering the benefits (Lin et al., 2012).

Fourth, the role of the sacrifice elements (privacy concerns and technicality issues) in negatively affecting the perceived value is deemed to be inconsiderable. Hence, sacrifice elements, despite being carefully selected to match potential losses incurred by airline passengers, are considered unimportant determinants of the adoption intention in the current research context. Disregarding the sacrifice elements is therefore regarded as a possibility. Kahneman and Tversky (1979) assert that in the decision-making process, people are less likely to respond to perceived losses compared with perceived gains. The notion of insignificant sacrifices is our interesting input to the existing body of knowledge, considering that this aspect diverts from VAM and its descendants, which echo the negative effects of sacrifice elements (Table 1) or the reverse positive effect when the technicality problem has been improved (Kim et al., 2019; Ko et al., 2009; Zhao et al., 2016).

Fifth, the mediating effect test confirmed that perceived value mediates the impact of the two benefit elements (i.e., the usefulness of location-based messages and the usefulness of customized-need messages) to adoption intention. These findings are in line with the mediator role of perceived value in previous VAM studies (Table 1). In terms of sacrifice elements, the mediating effect was not supported, which was expected. The reason is that the impact of the two sacrifice elements (i.e., privacy concerns and technicality issues) on perceived value was not significant, as shown in the structural model and hypothesis testing. If an independent variable does not have a significant effect on a mediator, then one of the conditions to establish mediation will not be fulfilled (Baron & Kenny, 1986).

Considering the unexpected significant positive effect drawn from technicality issues to adoption intention, even though this issue is beyond the scope of the current research and may possibly be examined in future research, the possible explanation could be the uniqueness of the current research context of a crisis. A crisis is a context in which the physical and well-being of stakeholders are threatened (Coombs, 2014). Consequently, immediate decisions and countermeasures are required within a limited period (Glaesser, 2006). Owing to the threat factor and the need for rapid actions to cope with the crisis, the intention to adopt airline crisis communication using a mobile app would be high, even in conditions where the technicality issues had increased. This finding implies that the special nature of a crisis could lead to a high intention to adopt this crisis survival tool, even though its ease of use, reliability, and efficiency may not function as well in non-crisis situations.

Conclusion

This study develops and validates a research model customized for the context of airline crisis communication via a mobile app. VAM and prospect and mental accounting theories are applied, and the determinants of adoption intention are tailored to suit the research context. The empirical test results suggest that while the main foundation of VAM remains, our proposed model validates the positive effects of the usefulness of location-based messages and the usefulness of customized-need messages without any considerable negative effects on privacy concerns or technicality issues. Furthermore, the findings partially support the definition and elements of value proposed by prospect and mental accounting theories. The overall findings support the high potential for utilizing mobile apps as effective airline crisis communication channels during a political crisis.

Limitations and suggestions for future research

The limitation of this research results from the reliance on a single type of political crisis that is assumed to occur at the airport, in which the services of airlines' mobile apps are available. Therefore, generalizing implications may be impossible across other types of crises or airline operation contexts with different conditions, such as on planes where the crisis communication via mobile apps may not be possible or accessible for every passenger. Even so, any crisis strategy should be adaptable for coping with a crisis in different contexts (Avraham & Ketter, 2008; Butler, 2009). Future research should consider adopting additional crisis scenarios to generalize broadly the implications of the proposed model. A set of influential determinants of the intention to adopt airline crisis communication using a mobile app, importance level of each influential determinant, and patterns of effects leading to the adoption intention could be dissimilar in different crisis types. This assumption is based on the argument that public attention is likely to be drawn to help victims in cases of natural disasters, whereas blaming stakeholders is normally raised by the public in a man-made catastrophe (Birkland, 1997).

Another limitation results from the large variety of respondents' nationalities with characteristics that are common to airline passengers in the survey. The findings cannot reflect the uniqueness of each specific culturally bounded context. Future studies may compare the results among groups of respondents coming from more than one culture and may consider a maximum likelihood-based multigroup analysis that determines invariance across different groups (Byrne, 2010). Comparing the results gained from different cultural groups could reveal interesting dissimilarities among cultures in their intention to adopt airline mobile apps in crises. This assumption is supported by previous studies showing that cultural values influence Asian

and non-Asian airlines in conducting crisis communication strategies differently (Haruta & Hallahan, 2003; Pinsdorf, 1991).

Considering the third limitation, the adoption of a non-probability sampling design, as utilized in this research, could produce inferior statistical inferences (Blair, Czaja, & Blair, 2014; Saunders et al., 2012; Sekaran, 2003) and generalizability issues (Creswell, 2014) than the case with a probability sampling design. To explain further, since the representative subset of a population is not identified in convenience sampling, participants who are readily available or accidentally appear at the selected site are recruited (Leedy & Ormrod, 2013). Owing to the narrow focus of this participant selection technique, the results yielded from the sample may not accurately represent the characteristics of the whole population targeted in the research, and thus generalizations to other settings could be limited (Salkind, 2010). However, convenience sampling was justifiably adopted because the identification of all members in the research population required by the probability sampling design (Sekaran, 2003) could not be performed in this study. Moreover, an effort was made to enlarge the focus of the selection and increase the generalizability of the results by carefully selecting research settings. We considered airline passengers coming from a large variety of countries and having diverse travel purposes. The screening questions were used to filter qualified respondents, such as those having common characteristics (e.g., international airline passengers using mobile apps). Given the aforementioned justification to use convenience sampling in this research, future studies that focus on population members who cannot be identified can apply convenience sampling and acknowledge this potential limitation.

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Table 1

Examples of previous VAM studies in which perceived value mediates between benefits/sacrifices, and behavioral intention/behavior.

Researchers	Research context	Determinants of perceived value
Chen et al. (2018)	Social commerce	Benefits: Enjoyment, perceived usefulness Sacrifices: Perceived sacrifice, perceived risk
Chung and Koo (2015)	Social media in travel information search	Benefits: Information reliability, enjoyment Sacrifices: Complexity, effort
Hsiao and Chen (2017)	E-book subscription services	Benefits: Perceived content Sacrifices: Perceived price
Hsu and Lin (2018)	Internet of things (IoT) services	Benefits: Compatibility, simplicity, economic value Sacrifices: Perceived privacy risk
Jun et al. (2018)	Mobile easy payment services	Benefits: Perceived usefulness, perceived enjoyment
Kim et al. (2019)	Online to offline (O2O) accommodation app services	Benefits: Perceived usefulness, perceived enjoyment Sacrifices: Technicality, privacy risk
Lin et al. (2012)	Internet Protocol Television (IPTV)	Benefits: Perceived benefits (impacted by personalization, high quality, content richness, and value-added services) Sacrifices: Perceived sacrifices (impacted by perceived fee, change of viewing habits, technicality, and knowledge of alternatives)
Seyal et al. (2014)	Mobile services	Benefits: Perceived usefulness
Wang et al. (2013)	Online content services	Benefits: Perceived usefulness, perceived enjoyment Sacrifices: Perceived fee

Wang et al., (2017)	Mobile Global Positioning System (GPS) navigation apps	Benefits: Compatibility, relative advantage, perceived enjoyment Sacrifices: Complexity, perceived cost
Yu et al. (2019)	Self-customization services	Benefits: Perceived enjoyment, perceived usefulness Sacrifices: Technicality, perceived fee
Zhao et al., (2016)	Brand microblog	Benefits: Usefulness, interestingness, reliability, responsiveness, connectedness

Table 2

Operational definition of variables.

Variable	Operational definition	References
Usefulness of location-based messages	The degree to which a person believes that receiving a location-based message would enhance his or her task performance	Adams et al., 1992, Davis et al. (1989)
Usefulness of customized-need messages	The degree to which a person believes that receiving a customized-need message would enhance his or her task performance	Adams et al., 1992, Davis et al. (1989)
Privacy concerns	The user' s fear of losing his or her privacy, unauthorized access to their data and controlling data loss caused by consumer preferences and locations being disclosed to service providers	Lankton and Mcknight (2011), Liu et al. (2015)
Technicality issues	The extent of difficulty experienced by a user in adopting airline crisis communication, using a mobile app	Kim et al. (2007), Kim et al., (2017), Yu et al., (2019)
Perceived value of airline crisis communication, using a mobile app	The net benefit of adopting airline crisis communication, using a mobile app, generated by the exchange between the desire benefits and the costs, perceived by airline passengers	Chen and Dubinsky (2003), Zeithaml (1988)
Intention to adopt airline crisis communication, using a mobile app	The degree to which a person intends to adopt airline crisis communication, using a mobile application, when facing the negative consequence from the airline's related crisis	Fishbein and Ajzen (1975), Lee and Mills (2010)

Table 3

Profile of respondents (n = 607).

Variable	Frequency	Percentage
Gender		
Male	264	43.5
Female	343	56.5
Age		
20-29	377	62.1
30-39	119	19.6
40-49	77	12.7
50-59	26	4.3
60+	8	1.3
Education		
High school/ secondary school	166	27.3
Diploma Associate degree	92	15.2
Bachelor degree	186	30.6
Master degree	151	24.9
Doctorate/PhD	12	2.0
Travel frequency		

Less than 1 time per year	60	9.9
1 - 2 times per year	203	33.4
3 - 4 times per year	185	30.5
5 - 6 times per year	83	13.7
7 times per year	76	12.5
Duration of using mobile apps		
Less than 1 year	23	3.8
1 - 2 years	56	9.2
3 - 4 years	125	20.6
5 - 6 years	214	35.3
7 years and more	189	31.1
Number of crisis previously faced		
Never	450	74.1
1 time	86	14.2
2 times	40	6.6
3 times	24	4.0
4 times and more	7	1.2
Nationality		
American	105	17.3
Chinese	65	10.7

German	52	8.6
Thai	49	8.1
Canadian	29	4.8
British	24	4.0
French	23	3.8
Singaporean	22	3.6
Indonesian	21	3.5
Swiss	18	3.0
Burmese	15	2.5
Japanese	12	2.0
Chinese (Hong Kong)	11	1.8
Norwegian	11	1.8
Malaysian	10	1.6
Others with less than 10 respondents	140	23.1

Table 4

Constructs, modified measurement items, and original scales.

Constructs and modified measurement items	Original scales
LB	
Receiving a location-based message on a mobile app...	
...would enable me to react to the political crisis more quickly. (LB1)	Kim et al. (2007)
... would enhance the effectiveness of my reaction to the political crisis. (LB2)	Kim et al. (2007)
...could help me react to the political crisis more easily. (LB3)	Kim et al. (2007)
...would improve my reaction to the political crisis. (LB4)	Kim et al. (2007)
...would be useful for me to react to the political crisis. (LB5)	Kim et al. (2007)
CN	
Receiving a customized-need message on a mobile app	
...would enable me to react to the political crisis more quickly. (CN1)	Kim et al. (2007)
...would enhance the effectiveness of my reaction to the political crisis. (CN2)	Kim et al. (2007)
...could help me react to the political crisis more easily. (CN3)	Kim et al. (2007)
...would improve my reaction to the political crisis. (CN4)	Kim et al. (2007)
...would be useful for me to react to the political crisis. (CN5)	Kim et al. (2007)
PRIV	
If the airline company used a mobile app as a crisis communication channel,	

...disclosing my personal information (e.g. location and preferences) to the airline company would make me lose control over my privacy. (PRIV1)	Kerviler et al. (2016)
...disclosing my personal information to the airline company would lead to a loss of privacy because my personal information could be used without my permission. (PRIV2)	Kerviler et al. (2016)
...disclosing my personal information to the airline company would expose me to the risk of internet hackers taking control of my personal information. (PRIV3)	Kerviler et al. (2016)
...my personal information disclosed to the airline company would be exposed to inappropriate parties. (PRIV4)	Kleijnen et al. (2007)
...my personal information disclosed to the airline company would be manipulated by inappropriate parties. (PRIV5)	Kleijnen et al. (2007)
TECH	
Due to the crisis situation,	
...it would be difficult for me to receive a crisis communication message on a mobile app. (TECH1)	Kim et al. (2007)
...the reception of a crisis communication message on a mobile app would be delayed. (TECH2)	Kim et al. (2007)
...it would be difficult for me to adjust my behavior according to information in a crisis communication message on mobile app. (TECH3)	Kim et al. (2007)
...the database for sending a crisis communication on a mobile app would be unreliable. (TECH4)	Kim et al. (2007)
...receiving a crisis communication message on a mobile app would	Lin et al. (2012)

require a lot of mental effort. (TECH5)	
PV	
Considering the usefulness of the location-based message that I would gain, receiving a crisis communication message on a mobile app would be beneficial for me. (PV1)	Lin et al. (2012)
Considering the usefulness of the customized-need message that I would gain, receiving a crisis communication message on a mobile app would be beneficial for me. (PV2)	Lin et al. (2012)
Overall, receiving a crisis communication message on a mobile app would bring good value. (PV3)	Kim et al. (2007)
Receiving a crisis communication message on a mobile app would fit my travel style. (PV4)	Lee and Mills (2010)
INT	
If a crisis occurred, ...then I would plan to receive a crisis communication message on a mobile app. (INT1)	Kim et al. (2007)
...then I would intend to receive a crisis communication message on a mobile app. (INT2)	Kim et al. (2007)
...then I would predict that I would receive a crisis communication message on a mobile app. (INT3)	Kim et al. (2007)
...then I would develop a high tendency to receive a crisis communication message on a mobile app. (INT4)	Gupta and Kim (2010)
...then I would be greatly willing to receive a crisis communication	Gupta and Kim

message on a mobile app. (INT5)	(2010)
...then I would be interested to receive a crisis communication message on a mobile app. (INT6)	Xu et al. (2009)

Notes: SFL (Standardized factor loadings), CR (Construct reliability), AVE (Average variance extracted), α (Cronbach's alpha), LB (Usefulness of location-based messages), CN (Usefulness of customized-need messages), PRIV (Privacy concerns), TECH (Technicality issues), PV (Perceived value of airline crisis communication using a mobile app), INT (Intention to adopt airline crisis communication using a mobile app)

Table 5

Statistics of confirmatory factor analysis (n = 607).

Constructs and modified measurement items	SFL	CR	AVE	α
LB		0.923	0.705	0.926
LB1	0.756			
LB2	0.855			
LB3	0.880			
LB4	0.847			
LB5	0.856			
CN		0.951	0.794	0.950
CN1	0.861			
CN2	0.905			
CN3	0.899			
CN4	0.899			
CN5	0.892			
PRIV		0.923	0.706	0.927
PRIV1	0.766			
PRIV2	0.791			
PRIV3	0.844			
PRIV4	0.914			
PRIV5	0.876			

TECH		0.849	0.530	0.849
TECH1	0.711			
TECH2	0.671			
TECH3	0.771			
TECH4	0.719			
TECH5	0.765			
PV		0.901	0.696	0.897
PV1	0.888			
PV2	0.859			
PV3	0.846			
PV4	0.737			
INT	0.860	0.915	0.644	0.912
INT1	0.881			
INT2	0.776			
INT3	0.839			
INT4	0.809			
INT5	0.809			
INT6	0.624			

Notes: SFL (Standardized factor loadings), CR (Construct reliability), AVE (Average variance extracted), α (Cronbach's alpha), LB (Usefulness of location-based messages), CN (Usefulness of customized-need messages), PRIV (Privacy concerns), TECH (Technicality issues), PV (Perceived value of airline crisis communication using a mobile app), INT (Intention to adopt airline crisis communication using a mobile app)

Table 6

Correlations for the constructs and square roots of AVE.

	LB	CN	PRIV	TECH	PV	INT
LB	**0.840**					
CN	0.783	**0.891**				
PRIV	0.102	0.098	**0.840**			
TECH	0.090	0.101	0.618	**0.728**		
PV	0.743	0.706	0.129	0.139	**0.834**	
INT	0.583	0.565	0.212	0.246	0.773	**0.802**

Note: The bold numbers shown in the diagonal row are square roots of AVE.

LB (Usefulness of location-based messages), CN (Usefulness of customized-need messages), PRIV (Privacy concerns), TECH (Technicality issues), PV (Perceived value of airline crisis communication using a mobile app), INT (Intention to adopt airline crisis communication using a mobile app)

Table 7

Standardized parameter estimates for structural model.

Paths	Standardized estimate	*t*-value	Hypothesis
H1 LB →PV	0.596	9.489	Supported
H2 CN→PV	0.254	4.399	Supported
H3 PRIV →PV	0.019	0.471	Not supported
H4 TECH →PV	0.061	1.426	Not supported
H5 PV → INT	0.800	21.140	Supported

Note: LB (Usefulness of location-based messages), CN (Usefulness of customized-need messages), PRIV (Privacy concerns), TECH (Technicality issues), PV (Perceived value of airline crisis communication using a mobile app), INT (Intention to adopt airline crisis communication using a mobile app)

Table 8

Direct and indirect effects and 95% confidence intervals (CI).

Paths	Estimated effect	95% CI lower bound	95% CI upper bound	*p*-value*	Significant (Y/N)
Direct effect					
LB → Intention	-0.121	-0.294	0.031	0.119	N
LB → PV	0.606	0.464	0.759	0.000	Y
PV → Intention	0.913	0.779	1.058	0.000	Y
CN → Intention	-0.044	-0.181	0.087	0.512	N
CN → PV	0.257	0.099	0.401	0.001	Y
Privacy → Intention	0.061	-0.043	0.176	0.240	N
Privacy → PV	0.011	-0.083	0.099	0.833	N
Tech → Intention	0.135	0.037	0.239	0.008	Y
Tech → PV	0.039	-0.061	0.146	0.452	N
Indirect effect					
LB → PV → Intention	0.553	0.409	0.746	0.000	Y
CN → PV → Intention	0.234	0.094	0.386	0.001	Y
Privacy → PV → Intention	0.01	-0.078	0.091	0.834	N
Tech → PV → Intention	0.036	-0.055	0.137	0.448	N

*The *p*-value is rounded to 3 decimal places.

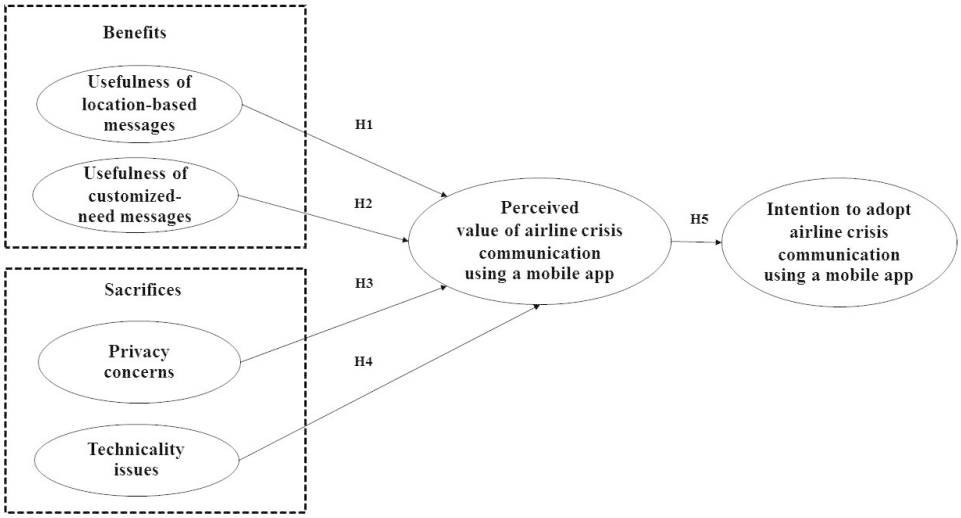

Figure 1 The proposed research model

338x190mm (96 x 96 DPI)

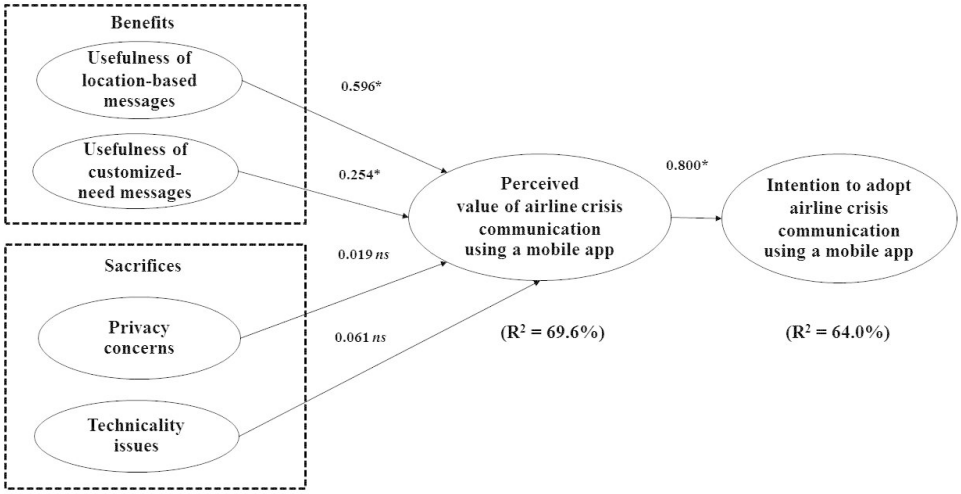

Figure 2 The results of the proposed research model. Note: n = 607, * Significant (p<0.001), ns Non-significant path (p>0.05)

338x190mm (96 x 96 DPI)

Appendix 1

Crisis Scenario: Please read the following scenario and **imagine yourself being in the crisis event** described below.

Political crisis

Imagine yourself **being in an airport** to board a flight scheduled on that day. However, **a political protest** suddenly occurs, and the airport serving your flight is occupied by the protesters. This political crisis results in **the closure of the airport** as well as **the cancellation** and **delay of several flights**. To determine **the effect of this crisis on your trip**, you check your mobile device and use **a mobile app** that was created by **your airline company.**

Meaning and example of a location-based message

A location-based message is delivered based on **the current location of each recipient**.
For example, imagine yourself being in the check-in area of an airport when the political crisis is unfolding.
The location-based message you receive from **the mobile app of the airline company** will read:
*"For further **assistance during this crisis situation**, please contact Counter Number 1 at Row X which is **the counter nearest you** in our check-in area."*

Meaning and example of a customized-need message

A customized-need message is delivered based on **the need** and **preference of each passenger**.
For example, **assuming that your native language is Japanese**, imagine yourself being in an airport where the political crisis is unfolding. Under this situation, the customized-need message you receive from **the mobile app of your airline company** will read as follows:
*"To contact **our Japanese-speaking staff members**, please call +66 2 450 8000 and press 2."*