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Mobile payment service usage: U.S. consumers' motivations and intentions

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ABSTRACT

Mobile payment services (MPSs) are expected to be one of the fastest growing segments of mobile marketing. However, MPSs in the U.S. are less popular than in other parts of the world such as Western Europe and Asia. By applying the Unified Theory of Acceptance and Use of Technology (UTAUT), this research explores the motivations and obstacles of accepting MPSs in the U.S. An online survey (n = 327) was conducted and the data were analyzed by multiple-regression and descriptive statistics. The study results demonstrate that U.S. consumers' intention to use MPSs is largely determined by their perceptions of performance expectancy, social influence, compatibility, knowledge, and trust. Especially, performance expectancy of MPSs was the most important factor for predicting U.S. consumers' intention to use MPSs. These findings provide important theoretical and practical implications for enhanced understanding of consumer behavior and MPSs.

The fast growth of smartphone adoption and technological advances in mobile devices enable individuals to use their mobile devices to pay for goods and services and transfer money between friends. Mobile payment services (MPSs), often referred to as a mobile wallet, mobile money transfer, contactless payment, or proximity payment are the fastest growing segments of mobile marketing. Since the first MPS became available to individuals in the U.S. by Google Wallet in 2011, many smartphone manufacturers and financials service providers have been embracing this innovative technology not only to provide benefits to their customers but also to expand their business into the new realm. One of the main benefits of MPSs for advertisers and marketers is to help them to reach their target more effectively. Massive amounts of customer-related big data (e.g. expense amounts, consumption patterns, lifestyles, and preferences) collected from MPSs help advertisers and marketers to better understand their target consumer behavior. Further, incorporating the MPSs into any mobile advertising campaigns helps advertisers to measure more accurately the return on investment of their mobile advertising campaigns. In summary, the ultimate benefit of MPSs is not simply limited to improving their users' life by providing value-added services, but also includes the acquisition by many advertisers and marketers of extensive data about users' consumption on mobile platforms, which enables the advertisers to predict more accurately consumer behaviors on mobile platforms and to develop more effective advertising campaigns.

Mobile shopping and purchasing have become one of the most popular shopping patterns among individuals across the U.S. with its estimated penetration rate of around 20.2% of the U.S. population in 2018 (Kats, 2018). With the aforementioned benefits, MPS users in the U.S. are forecasted to grow to 74.9 million by 2022 from 55 million in 2018 (eMarketer, 2018a). The adoption rate of mobile payment is expected to differ by age groups as younger groups are less apprehensive about adopting MPSs compared to older groups (eMarketer, 2019; O'Malley, 2016). According to eMarketer (2018c), 38.4 million Americans aged 14 and over have used their mobile phones to pay at the point of sales in the past six months. In addition, O'Malley (2016) asserted that Generation Z (18–24) is twice as likely to make a purchase on mobile devices than the other age groups.

Despite their benefits and fast growth, MPSs in the U.S. are still in their infancy compared to other parts of the world, such as Western Europe or Asia where the penetration rate of these services is larger than in the U.S. (eMarkter, 2018b). In addition, there is scant research exploring MPSs in the U.S. Previous studies of mobile payment in the U.S. are focused on the non-users or limited usage experience of MPSs (Dewan and Chen, 2005; Khalilzadeh et al., 2017), near-field communication (NFC) mobile payment in restaurant industry (Khalilzadeh et al., 2017), and based on outdated data before the advent of most contemporary MPSs (Garrett et al., 2014; Slade et al., 2015). Therefore, it is challenging for marketing and advertising practitioners to gain a better understanding of consumer behavior of MPSs in the U.S. Hence, this study explores the motivations and hindrances of accepting MPSs among its users in the

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U.S. In addition, this study examines the current status of MPSs by exploring how it is used among U.S. consumers.

RQ1: What is the current status of individuals' MPS usages in the U.S.?

1. Literature review

1.1. Defining mobile payment

It is important to review the validity of the current definition of MPS because of the various definitions from previous studies. Mobile payment is broadly defined as a service to provide users with the ability to initiate, authorize, and complete financial transactions in which money is transferred over mobile network or wireless communication technologies through the use of a mobile device (Dahlberg et al., 2003; Liébana-Cabanillas et al., 2014; Slade et al., 2015). Specifically, MPSs that are currently available in the U.S. can be further categorized into three different types: mobile proximity payment (MPP), mobile peer-to-peer (MP2P) payment, and mobile in-app payment (MIP). Therefore, the following section will review these three different types of MPS currently available in the U.S. to understand their differences and benefits.

First, as a relatively newer mobile payment technology that has not been used previously in the U.S., MPP services use novel technologies such as Bluetooth and Near Field Communication to exchange payment information between mobile devices and credit card terminals to complete offline transactions (Chandra et al., 2010). MPP services are usually offered by smartphone manufactures (e.g. Apple, Samsung) or financial institutions (e.g. Visa, Master Card, Bank of America) to their customers. With this, individuals can use their mobile payment devices as a form of payment to pay for goods and services by simply waving it near a credit card machine in retail stores. The biggest benefits of the MPP services are the convenience of removing the needs to carry cash, credit cards, or a wallet.

Second, MP2P payment services refer to mobile apps such as Venmo, Zelle, or Square Cash that have been more widely adopted by young individuals than other types of MPS. MP2P payment is defined as a transaction made between two individuals using a mobile phone as a payment method via mobile browsers and mobile apps (Karnouskos and Fokus, 2004;). These services enable individuals to send and receive money through mobile apps. For example, individuals can split their restaurant bills, group ticket purchases for events, or trip costs by transferring money via MP2P services.

Lastly, MIP services refer to the MPSs that enable individuals to pay for goods and services from pre-paid card information stored on individuals' mobile applications. MIP services use barcode technology that stores prepaid card information of proprietary stores/brands (e.g. Starbuck mobile app) on individuals' mobile devices. They not only enable individuals to collect, track, and use loyalty points of brands or stores they frequently visit, but also to pay for merchandise from the balance of their pre-paid store cards on mobile devices (Pinola, 2017). More details about each of these MPSs are summarized in Table 1. As various types of MPS become available in the U.S., they will become a mainstream payment method among individuals. Also, there will be high possibility that MPS will become a newer advertising platform where advertising effectiveness can be measured better. Therefore, it is important to understand the current status of MPS among individuals in the U.S.

Table 1
Types of mobile payment service available in the U.S.

Types	How it works	Examples	Usages and Benefits	Limitations
Mobile Proximity Payments (MPP)	Use credit or debit card information stored on mobile devices to make transaction wirelessly, often using Bluetooth or NFC technology	Apple Pay Samsung Pay	To pay for shopping both online and offline purchases. No need to swipe or insert card to the credit card terminal	Only available on the credit card terminals accept contactless payment Risk of losing credit card information when mobile device is hacked
Mobile peer to peer payments service (MP2P)	Send and receive money via mobile application or messenger services between users. MP2P service provider is a middle between financial institution and users	Venmo, Square cash, Zelle, Facebook payment	To send, request, and receive money among friends. Enable to split payment among friends and coworkers	Only works when both parties (sender and receiver) installed the mobile apps. Must have bank account or credit card to use
Mobile In-App Payments (MIP)	Use a mobile app barcode that stores prepaid card information to pay for products and services in a specific retail chain	Starbucks mobile card app Chick-Fil-A mobile app	To pay for shopping both online and off line Less risk of losing personal financial information Ability to track loyalty points	Can be used in Proprietary stores (e.g. Starbucks store) only Merchant need a separate barcode reader to read the prepaid card information

1.2. Theoretical background

The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) has been widely adopted as a primary theoretical framework to understand individuals' technology and new media adoptions. The UTAUT was developed as a comprehensive synthesis of prior theories (e.g. Theory of Reasoned Action, Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT)) of predicting individuals' acceptance of new media technologies or innovations. In the context of the advertising research, the UTAUT has mainly been used to predict and assess the advertising effectiveness in the new media environments (He and Lu, 2007; Wong et al., 2015). For example, the UTAUT hypothesized that an individual's intention to accept a technology can be predicted by four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions). Although the UTAUT was proven as a valid theoretical framework to predict individuals' uses of MPSs, previous studies identified the need for adding more constructs to the UTAUT to increase the explanatory power of the theory (Koenig-Lewis et al., 2015; Musa et al., 2015; Slade et al., 2015; Teo et al., 2015). This research proposes three new constructs (knowledge, trust/risk, and relative advantage) to the UTAUT and tests which constructs best predict individuals' intention to use MPSs.

1.3. Performance expectancy

Although mobile payment is still a relatively new technology with low penetration rate in the U.S., individuals' perceptions of mobile payment as a useful tool in their lives will be the important factor in predicting their use of MPSs. Individuals' perceptions of usefulness can be explained by the performance expectancy construct in the UTAUT. Performance expectancy is defined as the degree to which individuals believe that using the system will help them attain gains in job performance (Venkatesh et al., 2003). Previous studies on individuals' adoption of mobile payment identified performance expectancy as a major determinant of individuals' intention to use MPSs (Musa et al., 2015; Kim

et al., 2010; Koenig-Lewis et al., 2015; Liébana-Cabanillas et al., 2014; Slade et al., 2015; Tan et al., 2014; Teo et al., 2015). For example, in their studies of MPS users in France, Koenig-Lewis et al. (2015) found that perceived usefulness is a salient factor in explaining intention to use MPSs among young French individuals. In addition, Slade et al. (2015) found performance expectancy to be one of the strongest predictors of U.K. individuals' intentions to use MPS. Therefore, we postulate the following hypothesis.

H1. Performance expectancy will positively influence intention to use MPSs.

1.4. Effort expectancy

Ease of use has been considered an important predictor of individuals' adoption of new media technologies. In the TAM (Davis, 1985) and IDT (Rogers, 2003), perceived ease of use or complexity is one of the major constructs that influences individuals' intentions to adopt technologies. Similarly, effort expectancy is defined as the degree of ease of using technology in the UTAUT. Although previous studies suggested that effort expectancy is as an important construct to predict individuals' acceptance of technologies, there are conflicting results regarding its role in predicting individuals' uses of MPSs. For example, Koenig-Lewis et al. (2015), and Teo et al. (2015) found a significant influence of effort expectancy on individuals' uses of MPSs. However, Oliveira et al. (2016), Slade et al. (2015), Liébana-Cabanillas et al. (2014), Dastan (2016), Musa et al. (2015) failed to find a significant influence of effort expectancy or perceived ease of use on intention to use MPSs. Hence, this study examines the influence of effort expectancy on individuals' intention to use MPS.

RQ2: What's the role of effort expectancy on individual's intention to use MPSs.

1.5. Social influence

Generally, when individuals decide to adopt an innovation, they may feel uncomfortable with the uncertainty created by the innovation. To reduce the feeling of uncertainty, individuals tend to rely on their social networks to consult on their decisions by informative and normative social influence (Burkardt and Brass, 1990; Karahanna et al., 1999). Social influence is defined as a person's perception that most people who are important to them think they should or should not perform the behavior in question (Fishbein and Ajzen, 1975). The concept of social influence has been investigated by numerous technology acceptance studies and the results of those studies show that social influence positively affects individuals' technology acceptances (Hsu and Lu, 2004; Lucas and Spitler, 2000; Taylor and Todd, 1995; Yang, 2012; Venkatesh and Morris, 2000). For example, Hsu and Lu (2004) suggest that social influence has a positive and direct impact on individuals' adoption of on-line games.

In the context of MPSs, individuals may be influenced by their peers to use MPSs. According to the Network Effect Theory (Liebowitz and Margolis, 1994) an increase in usage of MPSs may directly increase the value of using MPS for other users. Therefore, once a critical mass of people in a social circle adopts an MPS, the entire circle is likely to adopt over time. For example, peer-to-peer MPSs such as Venmo wisely take this concept of social influence and offer social features like a payment stream reminiscent of Facebook's newsfeed where Venmo users can see how other users are sharing their money with their friends. Similarly, previous studies in mobile payment or the UTAUT have investigated how social influence can impact on individuals' adoptions of MPSs (Gu et al., 2009; Lu et al., 2005; Tan et al., 2014; Yang et al., 2012). For example, Slade et al. (2015) demonstrate that social influence has a positive impact on individuals' intentions to use mobile payment. Similarly, Yang (2012) show that social influence has a positive impact on the perceived advantage of MPS but has a negative impact on the perceived risk of the service in the initial adoption stage.

H2. Social Influence positively influences intention to use MPSs.

1.6. Compatibility/facilitating condition

In previous studies on technology adoption, the construct of compatibility is frequently used to explain individuals' adoptions of technologies (Agarwal and Prasad, 1998; Chau and Hu, 2001; Vijayasarathy, 2004; Wu and Wang, 2005). The previous IDT literature had defined compatibility as the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters (Rogers, 2003). Similarly, in the UTAUT literature, Venkatesh et al. (2003) asserted that 'facilitating conditions' are important to predict individuals' technology acceptances, which is rooted in a concept of compatibility in IDT. Previous studies show that when individuals feel an innovative technology fits their lifestyles, existing values, and needs, they tend to adopt the innovation more easily (Pham and Ho, 2015; Wu and Wang, 2005). Notably, Agarwal and Prasad (1998) suggest that compatibility is positively related to perceived ease of use the innovation. Furthermore, Wu and Wang (2005) indicate that compatibility also has a direct and positive impact on perceived usefulness and behavioral intention to use of the innovation. In the context of MPS, individuals' perceptions about MPS as a mean of improving their lifestyle or fitting with their lifestyle may positively influence their decisions to use the services.

H3. Compatibility positively influences intention to use MPSs.

1.7. Knowledge

Prior studies showed that individuals' knowledge about a product or service can have impact on their behaviors and choices (Alba and Hutchinson, 1987; Lee and Ro, 2016). In the context of technology acceptance, knowledge or experience of the technology has been considered an important construct that contributes to predict individuals' acceptance of technology (Garrett et al., 2014; Venkatesh et al., 2012; Kim et al., 2010; Mallat, 2007; Kim et al., 2008; Slade et al., 2015; Yang et al., 2015). Individuals' knowledge about how and where to use MPSs can be closely associated with intention to use them because the individuals may lose their financial assets or risk identity fraud due to unauthorized use or transaction error of MPSs (Dahlberg et al., 2003; Mallat, 2007). Particularly, as a relatively new technology in the U.S. with low penetration rate among individuals, it is plausible to think that most individuals may not fully understand how and where to use mobile payments services. Previous studies suggest that individuals with prior knowledge of or experience with technology are more likely to adopt it (Garrett et al., 2014; Venkatesh et al., 2012) and have a lower level of risk perception about MPSs (Slade et al., 2015). Therefore, we postulate the following hypothesis.

H4. Perceived knowledge positively influences intention to use MPSs.

1.8. Trust and risk

Trust and risk are demonstrated to be important predictors of individuals' technology acceptances in the previous literature (Dahlberg et al., 2003; Mallat, 2007; Pavlou, 2003; Slade et al., 2015; Zhang et al., 2012). Trust is found to be a key factor in emerging technologies and digital media as it significantly affects individuals' acceptances, intention to use, and attitude (Mou et al., 2017). In the context of MPSs, trust is an important construct that influences individuals' willingness to accept MPSs due to the personal nature of the mobile devices. Particularly, individuals may have concerns about privacy issues related to MPSs such as the fear that their purchases might be tracked by unwanted advertisers, their banking information could be compromised due to lack of

transaction records, or they might encounter unreliable network qualities of MPSs (Dahlberg et al., 2003; Mallat, 2007; Xin et al., 2015; Zhou, 2013). In addition, previous studies on MPSs asserted that individuals' lack of knowledge about MPSs could moderate their intentions to use MPSs. Such uncertainties or lack of knowledge of MPSs can decrease individuals' level of trust about the services or increase the perceived risk of MPSs (Slade et al., 2015). Previous studies also suggest that individuals' intentions to accept MPSs are largely dependent on their assessments of the trustworthiness of MPS providers, functional reliability of the service, and the general disposition to trust (Dahlberg et al., 2003; Xin et al., 2015). Therefore, if individuals perceive that an MPS provider is not trustworthy or is risky, they are less likely to use those MPSs. Especially, at the early stages of mobile payment adoption, individuals may have uncertainties regarding the stability and security of MPS due to their lack of understanding.

H5a. Perceived trust positively influences intention to use MPSs.

H5b. Perceived risk negatively influences intention to use MPSs.

1.9. Relative advantage

In the previous IDT studies, relative advantage is defined as the degree to which using an innovation is perceived as being better than using its precursor (Moore and Benbasat, 1991). In addition to its increasing popularity among individuals, the adoption of MPSs in the U.S. is accelerated by its relative advantage over the cumbersome procedure of processing traditional credit card payments (Malmad, 2016). Since October 2015, U.S. federal law calls for all banks in the U.S. to reimburse customers after fraud if merchants are not using the latest credit card terminals that require the credit card chip to be inserted into the terminal to make any credit card transactions (Figlolia, 2016). While credit card chip technology provides an enhanced security for credit card transactions, it slows down the entire credit card transaction process as compared to its predecessor (i.e. swiping the magnetic strip of credit card). Such MPSs as Starbucks mobile apps pay and Walmart mobile apps pay do not require those extra steps to complete transactions because they scan the barcode from mobile devices. Therefore, as more individuals think MPSs are relatively more convenient or advantageous than traditional credit card payments or cumbersome credit card chip technology, more individuals may adopt MPSs. Previous studies asserted that MPS users think of MPSs as more ubiquitous and convenient than credit cards (Mallat, 2007; Yang et al., 2012). Therefore, we postulate the following hypothesis.

H6. Relative advantage positively influences intention to use MPSs.

Table 2
Demographic profile of the sample (N = 304).

Demographic	Group	Frequency	Percent
Gender	Male	66	21.7
	Female	238	78.3
Age	18–24	299	98.4
	25–34	3	1.0
	Over 35	2	0.7
Income Level	Less than $24,999	62	20.4
	$25,000-$49,999	22	7.2
	$50,000-$74,999	23	7.6
	$75,000-$99,999	39	12.8
	$100,000-$149,999	58	19.1
	Over $ 150,000	100	32.9
Ethnicity	Anglo American	254	83.6
	African American	16	5.3
	Asian American	17	5.6
	Hispanic	12	4.9
	American Indian or Alaska Native	2	0.6

2. Method

2.1. Sample and procedure

An online survey via Qualtrics was used for data collection. A sample of undergraduate students from two major universities in the U.S. was conveniently chosen for survey data collection. College students were chosen as a sampling population due to their higher penetration rate of MPS usage among this age group (18–24) compared to the overall U.S. population (eMarketer, 2019). The study participants were recruited by an email invitation including a URL of an online survey and a consent form to participate in the study sent by researchers. All participants were given extra credit as an incentive for participating. A total of 907 college students were invited to the survey and 327 students participated in the online survey. After 23 incomplete responses were removed from 327 survey responses (out of 907 students who were invited to participate in the survey; response rate of 33.5%), the remaining sample of 304 was used for data analysis (Table 2).

2.2. Measurement

Regarding the operationalization of each construct, multi-item scales for the nine constructs were primarily adopted from previous studies (Gürhan-Canli, 2003; Pham and Ho, 2015; Slade et al., 2015; Yang et al., 2012). All items were measured with a five-point Likert scale ranging from strongly disagree to strongly agree or with a semantic differential scale (Appendix A). A pilot study was conducted with 30 U.S. young adults in order to check the validity of each survey instrument and the layout of the survey prior to data collection. Measurement items used in this study were checked for reliability through Cronbach's alpha. As shown in Table 3, all measurement items were found to be reliable with Cronbach's alphas ranging from 0.77 to 0.90.

3. Results

3.1. Descriptive analysis

Among the 304 responses, 238 (78.3%) were female and 66 (21.7%) were male students and almost all of them (98%) were aged between 18 and 24. Anglo Americans comprised most of the sample with 254 participants (83.6%), followed by Asian Americans (5.6%), African Americans (5.3%), Hispanics (4.9%), and American Indian or Alaska native (0.6%; Table 3).

To answer the RQ1, basic descriptive statistics (e.g. frequency analysis) was used. As shown in Table 4, among the 304 survey respondents, 283 (93.1%) had used MPSs previously, on average 9.3 times per month. The most frequently used MPS among the respondents was Venmo (83.6%), followed by the Starbucks mobile app payment (31.9%), Apple Pay (11.2%), Google or Samsung Pay (2.7%), and others (8.9%). Among

Table 3
Descriptive statistics of key variables (N = 304).

Variables	Mean	SD	Alpha	Measurement scale	# of items
Performance Expectancy	3.78	.71	.81	5-pt Likert	3
Effort Expectancy	3.95	.56	.90	5-pt Likert	4
Social Influence	3.13	.71	.85	5-pt Likert	3
Compatibility	3.68	.71	.77	5-pt Likert	3
Knowledge	3.49	1.02	.95	5-pt S.D.	3
Perceived Risk	2.56	.82	.84	5-pt Likert	3
Trust	3.20	.78	.84	5-pt Likert	3
Relative Advantage	3.34	.67	.86	5-pt Likert	3
Behavioral Intention	3.30	1.01	.87	5-pt Likert	3
Monthly MPSs Usage	9.31	8.41	N/A	Open-ended	1

Table 4
Descriptive stats of key variables.

	Frequency	Percentage
Mobile Payment Service Experience		
Yes	283	93.1
No	21	6.9
Length of mobile payment service usage		
Less than 1-moths	5	1.6
1–3 months	23	7.6
4–6 months	115	37.8
7mo – 1yrs	53	17.5
More than 1 year	87	28.6
Never used	21	6.9
Type of Mobile Payment Service Used (check all that applies)		
Venmo	254	83.6
Starbucks App	97	31.9
Apple Pay	34	11.2
Google Pay	6	2.0
Samsung Pay	2	0.7
Others (Panera, Chick-Fil-A, Visa mobile)	27	8.9

the 283 MPS users, 37.8% said that they started to use their first MPS in the last 4–6 months, followed by more than 1 year (28.6%), 7 months to 1 year (17.5%), 1–3 months (7.6%), and less than 1 month (1.6%).

3.2. Hypotheses testing

The current study employed multiple regression to test the relative importance of independent variables on the dependent variable. As shown in Table 5, the regression model was significant for predicting intention to use MPSs (Adjusted $R^2 = 0.51$, $F(8, 295) = 40.45$, $P < .001$). Several tests were performed to test the assumptions for multiple regression. Durbin-Watson statistics test (d = 1.94) confirmed the absence of any first-order linear autocorrelation. The plot analysis suggested a normal distribution and linear relations between dependent variable and independent variables. Lastly, multicollinearity was not found because the variance inflation factors were below 2.6 for all independent variables. The results showed that performance expectancy (H1), social influence (H2), compatibility (H3), knowledge (H4), and trust (H5a) had positive and significant relationships with behavioral intention. Among different predictors of intention to use MPSs, performance expectancy was the strongest predictor of behavioral intention (*beta* = 0.34, $P < .001$), followed by knowledge (*beta* = 0.25, $P < .001$), trust (*beta* = 0.17, $P < .01$), compatibility (*beta* = 0.15, $P < .05$), and social influence (*beta* = 0.09, $P < .05$). However, effort expectancy (RQ2 not supported), risk (H5b not supported), and relative advantage (H6 not supported) were not significant predictors of intention to use MPSs.

Table 5
Multiple regression analysis for predicting intention to use mobile payment services (N = 304).

	Regression Coefficient (b)	Standardized regression coefficient (β)	*t*
Constant	-.99		
Performance Expectancy	.48	.34	**4.68*****
Knowledge	.24	.25	**4.65*****
Trust	.23	.17	**3.09****
Compatibility	.21	.15	**2.18***
Social Influence	.13	.09	**2.15***
Effort Expectancy	-.05	-.03	-.76
Relative Advantage	-.05	-.04	-.69
Perceived Risk	.03	.02	.37
Adjusted R^2	**.51**		
F	**40.45*****		

*Significant at the 0.05 level. ** Significant at the 0.01 level. ***Significant at the 0.001 level.

4. Discussion

This study explored consumer acceptance and the current status of MPSs in the U.S. Based on the previous literature, research hypotheses and research questions were developed and tested via samples collected from U.S. college students who are active MPS users. Interestingly, MP2P services (e.g. Venmo) were the most popular MPS among the study participants, followed by MIP services (e.g. Starbucks app) and MPP (e.g. Apple Pay). This indicates that MPSs that utilize individuals' social networks are more frequently used by young individuals than other types of MPS in the U.S. Concurrent with previous studies, the empirical findings from this study suggested that individuals' intentions to adopt MPSs are largely determined by performance expectancy, knowledge, trust, compatibility, and social influence of MPSs. Practical implications for industry can be drawn the findings of this study. Especially, performance expectancy of MPSs was the most important factor to predict individuals' intention to adopt MPSs (Musa et al., 2015; Koenig-Lewis et al., 2015; Liébana-Cabanillas et al., 2014; Slade et al., 2015; Tan et al., 2014; Teo et al., 2015). Therefore, marketers and advertisers of MPSs should focus more on highlighting the usefulness of the service to its users and prospects to increase MPSs usage. For example, MP2P services like Venmo have already gained popularity among young individuals in the U.S. by providing useful ways of transferring money among friends. Additional analyses of our survey data also provide support for this result. Independent sample t-tests of MP2P service users and non-users showed that MP2P users showed higher level of performance expectancy ($M = 3.55$, $t = 2.10$, $P < .001$) and relative advantage ($M = 3.34$, $t = 3.32$, $P < .001$) of the MPS than non-users of MP2P services ($M_{\text{performance expectancy}} = 3.48$, $M_{\text{Relative advantage}} = 3.04$). Therefore, advertising campaigns of the MPSs should highlight the usefulness of the MPS using social media where they can utilize individuals' words of mouth.

Individuals' knowledge about how and where to use MPSs was the second strongest predictor of intention to adopt MPSs. As there are different types of MPS available, individuals' understandings of the different types of MPS and their usage are important predictors of individuals' adoption of MPSs. Specifically, MPSs require a certain level of technology efficacy. For example, individuals must understand how to install MPS apps, where to use them, or input their credit card information on mobile devices before their first usage. Therefore, marketers and advertisers can utilize the importance of knowledge on individuals' intentions to use mobile payments services to develop better marketing and advertising strategies. For example, many MPP service providers (e.g. Apple Pay) are placing a sign at the entrance of retail stores or on the credit card machines to increase individuals' knowledge about the acceptance of MPSs in the retail stores. In addition, providing incentives to MPS users may increase motivation to try the MPSs and gain better knowledge about the service. For example, marketers can provide exclusive discount offers to MPS users or provide exclusive promotional offers to users who refer MPS to their peers.

Concurrent with previous studies (Slade et al., 2015; Yang et al., 2012), this study confirms the effect of trust, social influence, and compatibility on behavioral intention of MPSs. Individuals' perception of MPSs as a trustworthy payment method is an important predictor of intentions to adopt the service. Therefore, professionals may want to establish strong security systems which protects privacy information of MPSs users. And advertising emssages promoting trustworthy security systems would generate strong trust toward MPSs. As MPSs advance continuously, the role of security and privacy should be taken into consideration when creating marketing communication strategies. In addition, individuals' perceptions of mobile payment as compatible means of their lives and social influence increased individuals' chances to adopt MPSs. Specifically, marketers and advertisers can utilize the social influence to motivate individuals to try MPSs. As suggested by previous

studies (Koenig-Lewis et al., 2015; Liebana-Cabanillas et al., 2014; Liebowitz and Margolis, 1994; Slade et al., 2015), peer influence is particularly important for young individuals in their decision-making process. Use of MPSs is often visible to others because it is often used in public or social contexts where individuals observe each other's behaviors and try to adapt their behaviors (Koenig-Lewis et al., 2015). Marketers and advertisers should identify the opinion leaders or social media influencers who help spread the positive buzz about the benefits of MPSs. Furthermore, marketers and advertisers should emphasize the compatibility of MPSs in ad campaigns. For example, co-advertising between MPSs and smartphone/smartwatch companies stressing the innovativeness characteristics of service may attract prospective users.

Interestingly, the study results failed to confirm the role of efforts expectancy on predicting individuals' adoption of MPSs. This may be because of the young individuals' overall high level of technology self-efficacy ($M_{\text{Effort Expectancy}} = 3.95$ SD = 0.56). The majority of the study respondents were already MPS users who possesses high level of knowledge about the MPSs through their own experiences. Regardless of its usefulness and advantages compared to conventional payment forms, the relative advantages of mobile payment are still not regarded as an important factor influencing individuals' behavioral intentions. This might be due to the cumbersome requirement of inserting a credit card for payment due to security requirement of the current MPP service users. Specifically, U.S. retailers using credit card chip technology still require MPP service users (e.g., Apply Pay users, Samsung Pay users) to sign and confirm their transactions on a credit card machine instead of finishing their transactions by simply waiving their mobile devices at credit card machines. This cumbersome requirement for MPP service users in the U.S. deprives the relative advantages of MPP service (i.e. easier and faster than using credit card) over its precursors (e.g. credit card or cash). This also implies that advertising campaigns of the MPSs should highlight some benefits or usefulness of MPSs that will overcome this cumbersome extra requirement of MPSs in the U.S.

Finally, this study has some theoretical contributions. The study results confirm the validity of the UTAUT in the context of young U.S. adults who are regarded as innovators or early adopters of MPSs. Regardless of its usefulness in understanding consumer behavior in technology mediated persuasion, the UTAUT has not been widely used in advertising research compared to its predecessors (e.g. Theory of Planned Behavior, TAM, Diffusion of Innovations). Although MPS itself is not an advertising medium, it is an important technology to help marketers and advertisers to measure the effectiveness of cross media advertising campaigns by providing big data related to various consumer payments. Besides, MPS companies may have access to individual users' transaction history. The data may be shared with advertisers to provide customized offers and incentives to individual users based on their spending history. Moreover, the data created by MPSs may reveal which products are most popular, and when consumers make transactions (http://latentview.com/ Latentview.com, 2016). Based on this information, advertisers and marketers may be able to provide product-specific coupons and real-time services. Lastly, the study results suggest the need to extend the UTAUT by determining the important roles of two additional variables (i.e. trust and knowledge) to predict individuals' behavioral intentions.

5. Conclusion

The goal of this research was to explore the motivations and obstacles for U.S. consumers to adopt MPSs based on UTAUT framework. The findings from the online survey revealed that performance expectancy, social influence, compatibility, knowledge, and trust were the important factors influencing U.S. consumers intention to use MPSs. By adding new constructs (knowledge, trust/risk, and relative advantage) to UTAUT, this research can contribute to expand.

UTAUT research in MPSs context. Also, the results of this research can provide an opportunity for practitioners to better understand of the values and potentials of MPSs in their businesses.

6. Limitations and future research

As with all research, this study has several limitations. As the adoption rate of MPSs is higher among young individuals than older counterparts in the U.S. (eMarketer, 2018a & 2019; O'Malley, 2016), using a student sample for this research was appropriate. However, the use of a homogeneous group (e.g. students) may limit the generalizability of the study results to the entire U.S. population. In addition, the high popularity of MP2P payment (e.g. Venmo) in the study sample might be caused by the greater sensitivity of young generations to their peer relationships. Considering the various types of MPS available in the U.S., future research should collect samples from more diverse groups of the U.S. population to enhance the generalizability and external validity. Such improvement will help future research to explore the influence of demographic factors on behavioral intention to adopt MPSs.

Regardless of its increasing popularity and importance among marketers and advertisers, only limited attempts have been made to investigate the adoption of MPSs among the U.S. users (Dewan and Chen, 2005; Garrett et al., 2014; Slade et al., 2015). Therefore, the present research findings provide some important insights about current MPS users in the U.S. to academic researchers and practitioners. However, since the majority of the respondents were current MPS users (93.1%), this study has limited scope to provide a comparative analysis of non-users' and users' perceptions of mobile payments services. Therefore, future research needs to collect the data from more diverse samples to explore the differences among users and nonusers of MPS. Lastly, the present study tested the direct effect of trust and risk on the intention to use MPSs. As previous studies (Mou et al., 2017; Pavlou, 2001) suggest, a strong trust may attenuate the perceived risks in the context of MPSs adaptation. Therefore, future research needs to look at the mediating effect of trust in the relationship between risk and intention to use MPSs.

Declaration of competing interest

The Authors declare that there is no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chbr.2020.100008.

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