Acceptance of Mobile Wallets in Mobile Commerce – an Empirical Study based on Austrian Generation Y

Elisabeth Sparber
FHWN - Campus Wieselburg
Michael Hollaus
University of Applied Sciences Wiener Neustadt, Campus Wieselburg
Robert Fina
Austrian Marketing University of Applied Sciences, Campus Wieselburg der Fachhochschule Wiener Neustadt GmbH

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Abstract **- This study was carried out to determine the acceptance of mobile wallets in mobile commerce in Austria based on the Technology Acceptance Model (TAM) by Davis. The TAM was expanded to include the constructs Perceived Security and Perceived Social Influence. The proposed research model was empirically tested on the basis of a quantitative online survey. A total of 134 data sets were obtained, of which 62 were valid. The subjects of this study are mobile wallet non-users living in Austria aged 25-40 years. The data collected was evaluated using Partial Least Squares structural equation models (PLS-SEM). Results show that the intention of Generation Y to use mobile wallets in Austria is significantly influenced by Perceived Usefulness, Perceived Security and Perceived Social Influence. However the Perceived Security has the greatest impact on the behavioral intention to use mobile wallets.**

Keywords – Mobile Wallets, Mobile Commerce, Technology Acceptance Model (TAM)

1 Introduction

Mobile payment usage is increasing worldwide. Advances in smartphone technology enable payment services to be made accessible to everyone regardless of time and place. However, mobile payment adoption rates vary greatly from country to country, whereas Asia is the clear leader here (Hines, 2020). In China, the market share of mobile payments was 83% in 2018 (Daxue Consulting, 2021). In Hong Kong, 91% of the surveyed smartphone users used mobile wallets in 2020 (Marketing Interactive, 2020). Also, on the Austrian market, the number of people who use smartphones to buy goods is steadily increasing. In 2020, compared to the previous year, the numbers even increased by 6% to 32 % (KMU Forschung Austria/Handelsverband, 2020). Contactless mobile payment via smartphone or tablet is already used by 32% of Austrians, either at the stationary point of sale or for remote payments. In the future, mobile payments are even expected to double (PricewaterhouseCoopers, 2019). In the case of mobile purchases using smartphones, online transfer / instant transfer, credit card and PayPal were the three most popular payment methods in 2019 (MindTake, 2019). The steady increase in purchases via smartphones (KMU Forschung Austria/Handelsverband, 2020) as well as the predicted doubling of mobile payments in Austria show the relevance of mobile payment on the Austrian market (PricewaterhouseCoopers, 2019). Research on the acceptance of mobile wallets in Austrian mobile commerce has not yet been dealt with and thus closes a scientific gap in this field of research. Based on previous research in other countries, the current acceptance of mobile wallets for payments by smartphone in mobile commerce of the Austrian Generation Y will be determined, whereas Generation Y is defined here as people born between 1980 and 1995 (Mangelsdorf, 2014).

2 Theoretical Background

2.1 Mobile Commerce

Mobile commerce (m-commerce) can be regarded as a logical synergy between two technologies that have been developed to a large extent in recent years. On the one hand, the Internet has developed rapidly with e-mail, the web and other uses. On the other hand, the development of mobile communication is also very active, and its relatively easy-to-use and

convenient devices have achieved a very high market penetration rate (Clement, 2002).

2.2 Mobile Payment

Mobile payments (M-Payment, mobile payment, MP) are payments made using mobile devices (Dahlberg, Mallat, Ondrus & Zmijewska, 2008). Mobile payment is a sub-area of mobile commerce, nonetheless mobile payments are not only used in mobile commerce (Turowski & Pousttchi, 2004). Depending on the technical solution and the place of payment, mobile payment can be subdivided into proximity payments (local payments) and remote payments (long-distance payments) (Hartmann, 2006). In the case of local payments, the payer and the payee are at the same place (Ceipidor, Medaglia, Marino, Sposato & Moroni, 2012). The data is exchanged contactlessly between the devices (Hartmann, 2006). Proximity technologies such as radio frequency (RFID) or near field communication (NFC) are used. With remote payments, payments are made regardless of the location of the payer and the payee (Ceipidor, Medaglia, Marino, Sposato & Moroni, 2012). This Paper focusses exclusively on remote payments in mobile commerce.

2.3 Mobile Wallet

The mobile wallet (M-Wallet) is a mobile payment application that maps the physical wallet in the virtual world and thus substitutes it (Shin, 2009). Like the physical wallet, it also includes other services such as customer cards, bonus cards, identity cards and other personal valuables in addition to the payment function (Tilborg & Jajodia, 2011). Mobile wallets are mostly located as an app on a smartphone (Schmidt, 2019).

2.4 Apple Pay

This paper shows how a mobile wallet application works based on the Apple Pay service from Apple. Credit and debit cards can be managed in the Apple Pay mobile wallet. The tokenization process makes mobile payments more secure than plastic payment cards (Burge, 2016). Apple Pay is based on the EMV (Europay, Mastercard and Visa) tokenization system, which protects the user's card information by replacing the primary account number (PAN) with a device account number (DAN) (Liu & Mattila, 2019). This means that when users pay with Apple Pay, the credit card or debit card numbers are not transferred, but unique, so-called Device Account Numbers, are linked, encrypted and securely stored on Secure Element Chips (SE). These secure

chips are located in the hardware. A separate token is generated for each transaction. This token grants a one-time authority for a specific payment for a specific amount to a specific trader (Burge, 2016).

3 Methodology

To answer the central research question on which factors influence the acceptance of mobile wallets, a quantitative survey based on the Technology Acceptance Model (Davis, 1987) is carried out using an online questionnaire as a survey instrument. Participants were reached through convenience sampling via e-mail.

The Technology Acceptance Model (TAM) was developed by Fred Davis in 1987 in order to find out the user acceptance of internal information systems. According to Davis, the lack of user acceptance is the main obstacle to the success of an information system. The technology acceptance model can be transferred to other technology applications and represents the basis for numerous international studies in the field of mobile payment (Wiedemann, Goeke & Pousttchi, 2008).

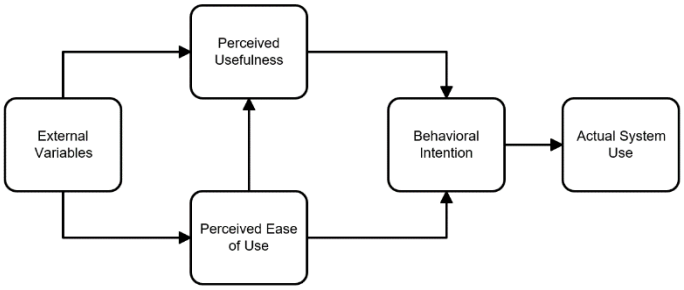

Figure 1. Technology Acceptance Model (TAM) by Fred Davis

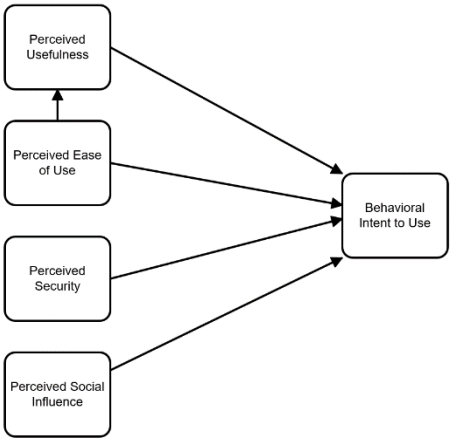

Figure 2. Proposed Mobile Payment Technology Acceptance Model

TAM assumes that the behavioral intention to use a technology is influenced by the two core factors Perceived Usefulness and the Perceived Ease of Use. External variables, such as training and system design features, have an impact on the perceived usefulness and

ease of use (Davis & Venkatesh, 2004). The easier a technology is to use, the more useful it is. This means that the Perceived Ease of Use (PEOU) can also have an influence on the Perceived Usefulness (PU) (Venkatesh, 2000). In many studies in the area of user acceptance of technologies, the Behavioral Intent to Use (IU) is the strongest predictive variable for user behavior. Furthermore, Davis' technology acceptance model is also based on the fact that user intent is the best predictor of user behavior (Actual System Use) (Davis &Venkatesh, 2004) The proposed model in Fig. 2 is expanded to include the variables Perceived Security and Perceived Social Influence, which are discussed further below.

3.1 Perceived usefulness

The Perceived Usefulness (PU) has a positive influence on the Behavioral Intent to Use mobile wallets (IU), which is why the following hypothesis is tested (Davis & Venkatesh, 2004):

H1: PU has a positive effect on IU.

3.2 Perceived Ease of Use

The Perceived Ease of Use (PEOU) of the mobile wallet applications influences the Perceived Usefulness (PU) of the users, as well as the Intention to Use (IU) mobile wallets (Davis & Venkatesh, 2004). This results in the following hypotheses:

H2: PEOU has a positive effect on PU.

H3: PEOU has a positive effect on IU.

3.3 Perceived Security

Perceived Security is the degree to which users believe that using a mobile payment application or shopping on e-commerce websites is safe (Yenisey, Ozok & Salvendy, 2005). The Perceived Security is also defined as the extent to which users believe it is safe assume that mobile devices do not pose a risk (Phoong, Phoong, Moghavvemi & Yeong, 2019).

H4: PS has a positive effect on IU.

3.4 Perceived Social Influence (PSI)

The perceived social influence is a construct of the UTAUT model (Unified Theory of Acceptance and Use of Technology) (Venkatesh, Morris, Davis & Davis, 2003), which influences the Behavioral Intent to Use (IU) to use a technology. This is the extent to which users

perceive that people who are important to them, such as friends and family, are convinced that they should use a certain technology (Venkatesh, Thong & Xu, 2012).

H5: PSI has a positive effect on IU.

To evaluate the collected data, a Partial Least Squares-Path Modeling analysis is conducted to examine the relationship of the stated variables.

4 Results

In a first step the whole model is evaluated by assessing the Goodness-of-Fit-Index (GoF = .604; GoF-Bootstrap = .603), which shows a good fit. The second step entails the evaluation of the measurement models (outer models), In this case all variables have a value higher than .700 (Dillon.Goldsteins Rho) which shows a good suitability of the external model. The last step entails the evaluation of the structural model (inner model) and tests the posed hypotheses. As can be seen in Figure 3, the inner model has consistently good values, only hypothesis 3 could not be confirmed. Percived usefulness (b = 0.343; t = 3.094; p = .003, f^2 = .168) has the greatest influence on the behavioral intention to use, followed by Percived security (b = 0.326; t = 3.563; p = .001, f^2 = .223).

Hypotheses	Path	Path coefficient	t	(Pr > |t|)	f^2	Hypothesis test result
H1	PU -> IU	0,343	3,094	.003	0,168	✓
H2	PEOU -> PU	0,720	8,026	.001	1,074	✓
H3	PEOU -> IU	0,176	1,764	.083	0,055	X
H4	PS -> IU	0,326	3,563	.001	0,223	✓
H5	PSI -> IU	0,210	2,728	.008	0,131	✓

Figure 3. Inner Model and Hypotheses-test - PLS-PM

5. Discussion

The proposed model can explain the behavioral intention to use mobile wallets to 74.30%. The variables perceived usage, perceived security and perceived social influence have significant relationships with the intent to use mobile wallets. Perceived Security has the strongest influence on the intention to use mobile wallets, followed by Perceived Usage. Therefore the established hypotheses H1, H4 and H5 can be confirmed. The perceived ease of use shows no significant

correlation to the intended use, but has a strong effect on the perceived benefit. As a result, the H3 is discarded and the H2 can be confirmed. With reference to the four exogenous constructs that influence the endogenous construct Behavioral Intention to Use, the variable Perceived Security has the highest significance with a p-value of 0.001. The path coefficient is the second highest with a value of 0.326. The Perceived Usage construct represents the construct with the highest path coefficient of 0.343. The significance value of PU is 0.003. The significance of PU is thus somewhat lower than that of the variable PS. In order to increase the acceptance of Generation Y mobile wallets on the Austrian market, the main focus should be placed on perceived security and perceived usage.

More research is needed to determine the validity of the model proposed here. The next step is to extend this study to a larger representative sample.

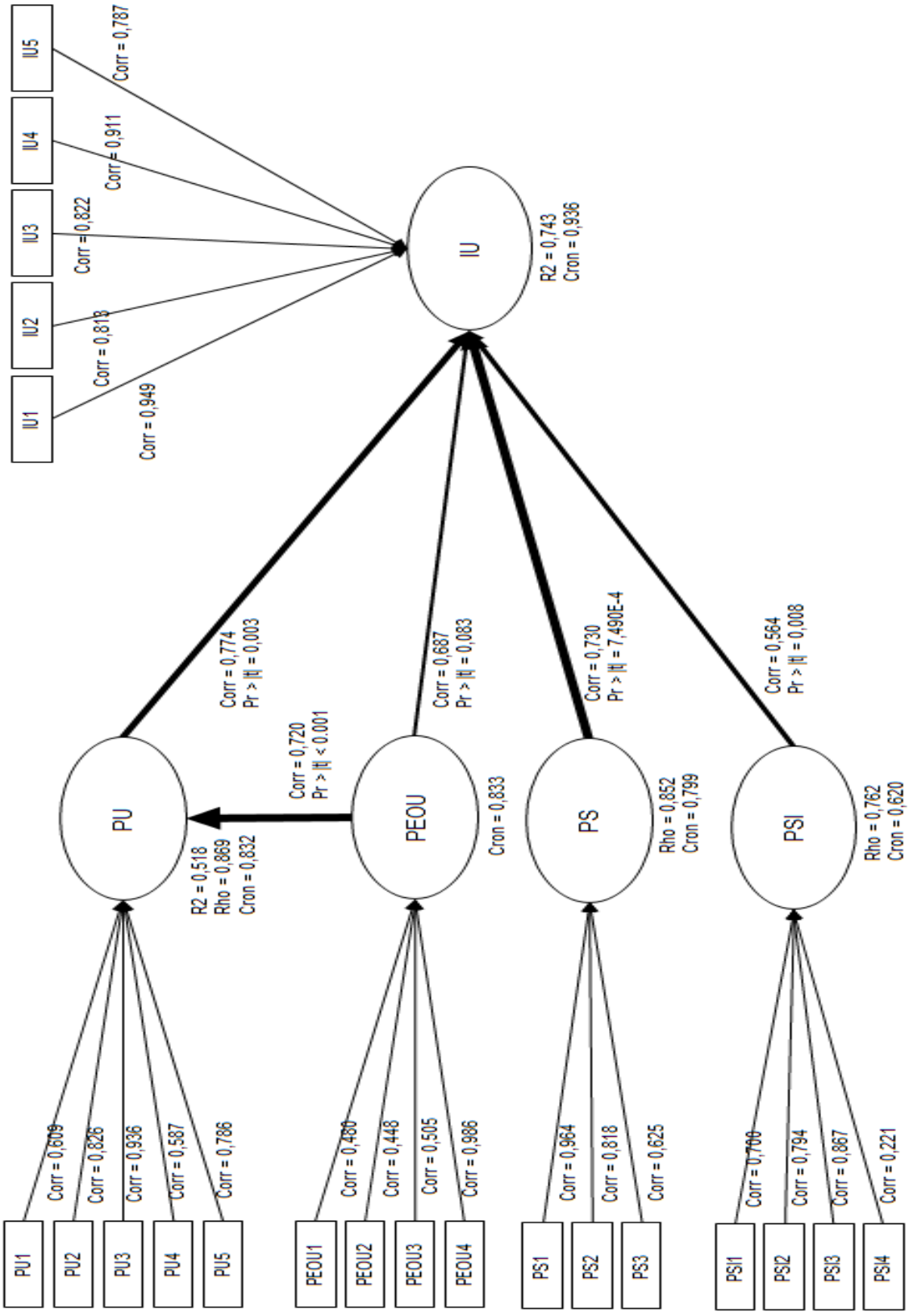

Figure 4. Mobile Payment Technology Acceptance Model - Results

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