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Technology Readiness in Customers' Perception and Acceptance of M(obile)-Payment: An Empirical Study in Finland, Germany, the USA and Japan

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Abstract. In today`s mobile world there is a high potential for m(obile)-payment services, but the mere existence of such services does not mean that the market is ready for them. M-payment services must add value to attract new users. After years of research regarding technology acceptance (TA) of m-payment, the aim of this paper is to examine how technology readiness (TR) influences customers' perception and acceptance of m-payment. TA of consumers in combination with TR is investigated for m-payment in Finland, Germany, the USA and Japan. We conduct an online survey to collect data in those four countries. We use that data to carry out a TA analysis using a structural equation model (SEM). The research model arises from the findings of a priori explorative study and a comprehensive literature review. Evaluation results based on an extended TA model (TAM) show that user acceptance of m-payment differs influenced by constructs.

Keywords: M-Payment, Technology Readiness, Customer Acceptance and Perception, Empirical Study, Structural Equation Model

1 Introduction

1.1 Motivation

The spread of mobile information and communication technologies has increased strongly in the recent years. There were nearly six billion mobile phone subscriptions by the end of 2011, and the tendency is still rising [1]. Being available and able to operate anytime and anywhere is a feature of modern society [2]. M-payment allows consumers to make electronic payments using their mobile devices [3]. As more users adopt various types of mobile devices, new mobile business models are constantly opened up and developed. Considering these requirements the possibilities and opportunities are huge, and m-payment has a realistic chance to become the future standard payment method. The challenge lies in an implementation that creates value for the consumers. Considering, that the idea and hype around m-payment was already present in early 2000 and therefore not entirely new, m-payment has been only success-

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ful in a few countries. The success or the failure of m-payment depends heavily on the consumer acceptance and their technology readiness [4], [5]. Several theoretical models have been proposed to explain a person's attitude and behavior towards new information technologies (IT). One of the most widely accepted models is the TAM [6-9], [11]. Previous studies in the sector of consumer acceptance and adoption of m-payment focused on costs [10-14], convenience [15-17], security [18], [14], [17], [19] trust [16], [13], ease of use, and usefulness [18-21] but there are no specific studies that examine the adoption of m-payment extending the TAM by TR in different countries and cultures. The importance of the combination of TAM and TR in general is also seen by Lin et al. who remark that "TAM and TR are interrelated" and "the measurement of usefulness and ease of use in TAM is specific for a particular system (i.e., system-specific) while TR is for general technology beliefs (i.e., individual-specific)" [22]. Given the ongoing globalization, there is an urgent need to learn how widely TAM applies in other countries and cultures [23]. Individuals are different in their technological interactions and cultural differences. This "may affect a multinational organization's ability to adopt and utilize IT" [23]. Analogously nowadays, this effect could also affect mobile services like m-payment. While some individuals may perceive m-payment with more interest, others might feel more concerned. Such distinctions can make the difference between success and failure in implementing mobile systems [23]. Therefore, when examining the perception and behavior towards m-payment, this paper takes the individual's personality traits regarding the tendency to use technology into account [23]. Parasuraman states that "There is also a need for comparative studies of technology readiness across countries and cultures" [5]. This paper's contribution is to analyze how TR affects the acceptance of consumers towards m-payment in different countries. In order to do this, an empirical study in Finland, Germany, the USA, and Japan is conducted. These four countries are chosen, because each is at a different developmental stage regarding m-payment [25]. Due to this, the current study aims to fill the research gap by developing and evaluating an extended TAM that integrates the direct role of TR. We investigate if differences in user acceptance of m-payment are influenced by constructs and cultures. For this purpose, we give an overview of the current state of each regarded country. Section 2 describes the research methodology and the underlying hypotheses. Section 3 presents the data collection, data analysis and modeling. Section 4 presents and discusses the results, followed by the limitations of this study. Ultimately, Section 5 gives a conclusion from the findings and an outlook for further research.

1.2 Status Quo

The mobile industry in Finland has always been an important sector, not at least, because of the Finnish mobile phone manufacture, Nokia. In Europe, the northern countries, especially Finland, are regarded as pioneers in the mobile industry. Table 1 presents the mobile penetration for each country and the GDP per capita. As we can see Finland shows a very high mobile penetration. In Finland m-payment is mostly used for public transportation (e. g. Helsinki City Transport) and vending machines. Germany has a high mobile penetration. Though these conditions are actually good for

implementing m-payment, so far m-payment is in its infancy and mostly used for public transportation (e. g. Deutsche Bahn). The use of m-payment in the USA has been lagging behind expectations [25] and m-payment is just beginning to emerge in the USA. At the moment, there are several projects involving m-payment, e. g. in gastronomy segments (e. g. Starbucks), or m-payment solutions such as Google Wallet or PayPal Mobile. Japan is currently the biggest market for m-payment. M-payment is used for different scenarios, such as for gastronomy (e. g. McDonalds), retail, vending machines, and public transportations (e. g. East Japan Railway Group).

Table 1. Statistics – FIN, GER, USA, JPN

Country	Population	Mobile phone subscriptions	Population in %	GDP-per capita (2011)
Finland	5.38 million	8.4 million	156%	$36.700
Germany	81.75 million	109 million	133%	$38.400
USA	311.98 million	302.9 million	97%	$49.000
Japan	127.66 million	124.19 million	97%	$35.200

1.3 Cultural Differences

In the literature, we find different views on how a culture can be characterized, measured and compared. The most accepted research is the framework by Hofstede [26-28]. Hofstede [31] separates the cultural dimension into five bipolar dimensions, which became the basis of his characterizations of culture for each country [29], [30]: Power Distance Index (PDI) describes the degree to which the less powerful members of a society expect and accept that wealth and power is distributed unequally [30], [31]. Individualism versus Collectivism (IDV): Individualism which reflects the high side of this dimension, can be understood as a preference for a social framework in which individuals are only expected to take care of themselves and their immediate families. In contrast, collectivism defines unquestioning loyalty between members of a particular group in a society [31]. Masculinity versus Femininity (MAS), the masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness and material reward for success. Femininity on the other side, stands for a preference to care for the weak and quality of life as well as for cooperation [31]. Uncertainty Avoidance (UAI), the uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity and Long-Term Orientation (LTO). The LTO dimension can be interpreted as dealing with society's search for virtue [31]. A sixth dimension, Indulgence versus Restraint (IVR) has been added, but since there were no scores available, we have excluded this dimension. Table 2 presents the cultural dimensions of Finland, Germany, the USA, and Japan. The values for each country are taken from Hofstede's research on cultural dimensions [31]. The PDI shows a low score which indicates that inhabitants seek for equal treatment regardless from formal positions. IDV show for the USA a high score (91) and indicate that the Americans tend to adopt the role of self-supporter for them and their families.

Table 2. Cultural Dimensions for Finland, Germany, the USA and Japan

Country	PDI	IDV	MAS	UAI	LTO
Finland	33	63	26	59	41
Germany	35	67	66	65	31
USA	40	91	62	46	29
Japan	54	46	95	92	80

MAS indicate for Japan a high score (95) and express a stronger preference for immaterial and material rewards for success, while Finland shows a low score (26), expressing the care for the weak and the quality of life. UAI for Finland, Germany and the USA are roughly the same, while Japan shows again a high score (92). It indicates the maintenance of codes and beliefs and the rejection of extraordinary. LTO shows for Japan a high value (80) and indicates a stronger adjustment for the future. Overall, it seems that Japan strongly differs in three of five dimensions (MAS, UAI, LTO).

2 Research Design and Hypotheses Generation

TAM, as one of the most frequently used theories in Information Systems (IS) research [32], was inspired by the theory of reasoned action (TRA) of Fishbein and Ajzen [33]. It was an early attempt to apply psychological factors to computer and IS adoption [34]. The TAM models how users accept and use a technology. It was originally introduced and developed by Davis [6], based on the TRA [33]. TAM adopts the causal relationships to explain an individual's IS acceptance behavior and is a specific, preeminent theory of technology acceptance in IS research. Two factors determine user acceptance:

- Perceived usefulness (PU) is defined as"the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational setting" [7].
- Perceived ease-of-use (PEOU) refers to "the degree to which the prospective user expects the target system to be free of effort" [7].

Davis et al. [7] determined that the frequency and intensity of using computer technology can be reasonably well predicted from a person's intention. PU is a major determinant of people's intention to use computer technology (INTUSE). PEOU is a significant secondary determinant of the same. Beyond PEOU and PU, the user's attitude towards using technology influences INTUSE, which is again influenced by PEOU and PU. The explanatory power of TAM is just as good as without regarding the originally included construct of 'attitude towards using a technology' [8]. TAM posits that PU is influenced by PEOU because, other things being equal, the easier a technology is to use, the more useful it can be [9]. Consistent with the TRA, TAM suggests that the effect of external variables (e. g. system design characteristics) on INTUSE is mediated by the key beliefs (e. g. PEOU and PU) [9]. Therefore, we propose the following hypotheses in the context of m-payment:

- H_1: PEOU will have a positive effect on PU.

PEOU has a direct effect on the INTUSE to use m-payment, and an indirect effect on INTUSE via PU. This is in consequence an initial hurdle that must be overcome for acceptance and finally adoption and usage of a system or service [6].

- H_2: PEOU will have a positive effect on INTUSE.
- H_3: PU will have a positive effect on INTUSE.

To identify other important factors influencing the TA of m-payment and to get valid information for the following quantitative analysis, we conducted an a priori explorative study. Sampling includes experts in the field of m-payment from Finland, Germany, the USA and Japan. The results of this explorative study were used to gain an overview as well as to brighten and outline the problem areas. Additionally, we gathered the most important and most consistent positions from the literature to adjust them with the results of the explorative study. Within these investigations it became apparent that it seems to be promising to combine TAM with the direct role of TR considering an intercultural background.

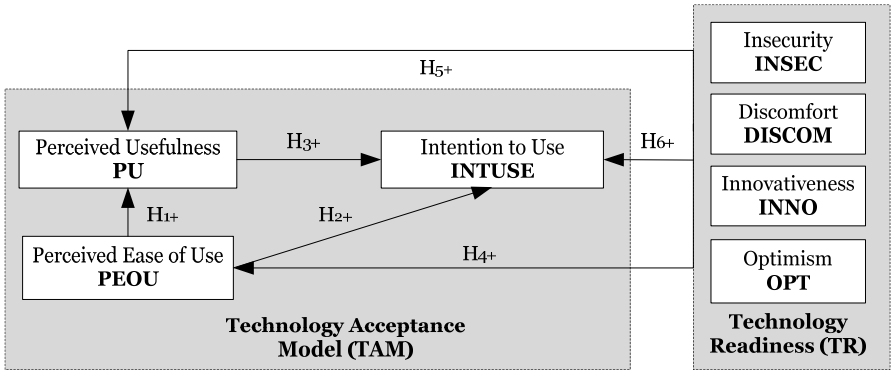

Fig. 1. Conceptual Research Model

Research by Rogers [35] suggests that there are differences in people's attitudes towards using technologies. TR is an attitudinal construct referring to an individual's predisposition to use new technologies and refers to people's propensity to embrace and use new technologies to accomplish goals at work and in leisure time [5]. TR can be viewed as an overall mental state resulting from a gestalt of mental enablers and inhibitors that together determine a person's tendency to use new technologies and services. Research on the determinants and consequences of adopting new technologies and services has gone on for years. New technologies in general are now proliferating through various facets of everyday life at a much faster speed than ever before. The proliferation of technology-based services and products, and evidence of the frustrations and challenges associated with using them effectively, suggest an urgent need for academic inquiries into important issues like aspects on how ready potentially users are to embrace and effectively use new technologies [5] like m-payment. The

overall-construct of TR consists of four sub-dimensions: optimism (OPT), innovativeness (INNO), discomfort (DISCOM), and insecurity (INSEC). The scale to measure these constructs in the context of TR is developed by Parasuraman [5] and Parasuraman & Colby [37]. These four dimensions are relatively independent of each other, with each trait indicating a person's openness to technology. OPT and INNO are drivers of TR, while DISCOM and INSEC are inhibitors. The correlation between people's TR and their propensity to employ technology is empirically confirmed by Parasuraman [5]. Yen [36] found that not all users of technology-based products or services are equally ready to embrace these products or services. Additionally, Parasuraman & Colby [37] argue that user segments with differing TR profiles vary significantly in terms of internet-based behaviors. TR cannot be ignored in assessing users' adoption of technology-based services like m-payment. The current paper fills this research gap by integrating TR into TAM in the context of m-payment.

The first dimension of TR, OPT is related to a positive view of technology. OPT refers to "a belief that technology offers people increased control, flexibility and efficiency in their lives" [5], and represents a positive view and a dimension of confidence in technology. Optimists are more willing to use new technologies like m-payment because they tend to accept their situation and are less likely to be escapist [38]. OPT is one of two contributors that increase TR.

INNO, which is the second contributor to increase TR, reflects the extent to which an individual believes he or she is at the leading edge of new technologies or technology-based services and products like m-payment [5]. This is similar to the theory construct of personal innovativeness in IT in the IS field [39]. Different studies supported including this attribute in explaining TA decisions, particularly for identifying early adopters of new technologies and services. Innovative consumers tend to learn new technology on their own, and may need less support. On the contrary, consumers who are low on innovative beliefs may want and need more advice, guidance and support. INNO is most closely related to ease of use, but might be less concerned with ease of use, because users are quite willing, and prefer, to "figure it out" themselves.

DISCOM is a perception of lack of control over technology and a feeling of being overwhelmed by it [5]. It represents the extent to which people have a general anxiety about technology-based services or products. DISCOM is one of two inhibitors of technology use, or making users reluctant to use technology. This construct overall measures the degree to which people have a general prejudice against technology-based services or products such as m-payment.

In addition to OPT, INNO, and DISCOM, the next sub-dimension that is considered in the research model is INSEC. Future visions of mobile services like m-payment present solutions where information about the user is increasingly collected and transferred to the services, for instance to provide users with more personally and contextually relevant services. The user needs to feel like they are in control while still having their privacy protected [5]. Underlying the construct TR is the acknowledgement that technology has been shown to simultaneously trigger both negative and positive feelings [40-41]. In this context Parasuraman [5] suggests that one of these feelings will exhibit relative dominance in the individual. Therefore, individuals' attitudes towards m-payment as self-service technology will range on a continuum

from strongly negative to strongly positive. Therefore, we propose the following hypotheses:

- H_4: TR will have a positive effect on PEOU.
- H_5: TR will have a positive effect on PU.
- H_6: TR will have a positive effect on INTUSE.

3 Data Collection, Data Analysis and Modeling

3.1 Sample and Procedure

To test the relationships implied by the research model and the research hypotheses, this study used a survey instrument for data collection. The first part of the survey was designed to capture respondents' PU, PEOU and INTUSE m-payment. The second part measured respondents TR including the subdimensions OPT, INNO, DISCOM, and INSEC. We used two approaches to collect the data. First, we used online networking websites. Second, to increase the response rate, the link to the questionnaire is mailed to further participants with personalized cover letters that explained the study and guaranteed the confidentiality of the collected data. The demographic profile of the sample is shown in Table 3.

Table 3. Demographic Profile

Construct	**FIN = 50**		**GER = 115**		**USA = 52**		**JPN = 53**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Gender								
Female	35	70,0	41	35,7	36	69,2	35	66,0
Male	15	30,0	74	64,3	16	30,8	18	34,0
Age								
<18	3	6,0	0	0,0	2	3,8	3	5,7
18-25	26	52,0	86	74,8	25	48,1	31	58,5
26-35	9	18,0	29	25,2	16	30,8	9	17,0
36-45	1	2,0	0	0,0	3	5,8	6	11,3
46-60	9	18,0	0	0,0	5	9,6	2	3,8
>60	2	4,0	0	0,0	1	1,9	2	3,8
Profession								
Student	22	44,0	96	83,5	31	59,6	29	54,7
Employee	13	26,0	15	13,0	14	26,9	15	28,3
Public officer	4	8,0	3	2,6	0	0,0	1	1,9
Self employed	5	10,0	1	0,9	4	7,7	5	9,4
Pension	0	0,0	0	0,0	0	0,0	2	3,8
Not specified	6	12,0	0	0,0	3	5,8	1	1,9

The survey consists of closed-ended questions on a five point Likert type scale (5 – totally agree, 4 – agree, 3 – neutral, 2 – disagree, 1 – totally disagree). Similar to the

instrument used by Anckar & D'Incau [42], respondents were instructed to indicate how strongly they agree or disagree with a number of statements relating to their perceived magnitude of some barriers to embrace mobile services with a special relevance in m-payment. The survey was conducted in English and sent out to the respondents in all four countries. One thousand questionnaires were issued and 438 people responded, for an initial response rate of 43, 8 %. Incomplete or otherwise unusable entries were discarded from the data set, leaving 270 usable responses (27%).

3.2 Measurement and Model Testing

The literature was examined for validated measures involving the constructs already mentioned. The TAM scales of PU, PEOU, and INTUSE were measured using indicators adapted from Davis [6] and Davis et al. [7]. The measurement of TR was partly adapted from Parasuraman [5] and we created a composite TR based on the averages of each sub-dimension. Hence, the final latent construct TR consists of four indicators which reflect the average of each sub dimension. Due to the large number of indicators in the questionnaire, a factor analysis was conducted as a dimensional reduction method. The factor analysis was conducted using varimax rotation as the extraction method. The indicators are identified based on a value of greater than one. The total number of indicators was reduced based on the four constructs, with a total of 23 indicators. These constructs are expected to make the SEM efficient.

Empirical data is analyzed with SEM to test the causal-effect relations among the latent constructs. This method is based on latent variable modeling, where the measurement error is minimized through the use of multiple indicators of latent variables before testing model fit. SEM provides the flexibility to model a relationship among criterion variables and multiple predictors, such as model errors in measurements for observed variables, to design unobservable latent variables, and statistically test a priori theoretical and measurement assumptions against empirical data [43]. SEMs consist of latent variables that are generally operationalized through measurement models. Measurement models are based on indicators that relate to the hypothesized construct in order to "turn" it into a comprehensive and measureable construct. Measurement validation and model testing were conducted using SmartPLS (Partial Least Squares) version 2.0.M3, a variance analytical SEM technique that utilizes a component-based approach to estimation. The PLS approach by Chin [43] is used to test our research model, using the empirical data from the survey. PLS is advantageous when the research model has variety indicators, is relatively complex, and the measures are not well established [44].

3.3 Measurement Validation

The measurement model analyzes the relationship between the latent constructs and their associated indicators. Indicators, also known as items or measures, are quantifiable, observable scores obtained through empirical means such as quantitative study [45]. In IS literature, reflective constructs are used for concepts such as PU, satisfac-

tion, PEOU, and predicted usage, where the unobservable can be considered to give "rise to something observed" [46]. Researchers believed the measures in TAM are well specified reflectively [47].

Table 4. Quality Criteria – Measurement Model

Reliability and Validity Criterions				
Construct	Composite Reliability (ICR) ($\rho \geq 0.7$)	Loadings ($\geq 0{,}50$)[a]	Average Variance Extracted AVE(ξi) ≥ 0.5[b]	Factor Loadings (factors load stronger on dedicated indicators)
GER				
PU	0.916	0.744	0.731	✓
PEOU	0.937	0.752	0.654	✓
INTUSE	0.961	0.880	0.780	✓
TR	0.779	0.888	0.448	✓
JPN				
PU	0.844	0.729	0.579	✓
PEOU	0.922	0.610	0.600	✓
INTUSE	0.939	0.796	0.691	✓
TR	0.776	0.516	0.477	✓
FIN				
PU	0.907	0.732	0.711	✓
PEOU	0.954	0.792	0.721	✓
INTUSE	0.938	0.786	0.686	✓
TR	0.803	0.574	0.513	✓
USA				
PU	0.927	0.814	0.760	✓
PEOU	0.934	0.779	0.641	✓
INTUSE	0.951	0.688	0.740	✓
TR	0.804	0.506	0.522	✓

[a] Loadings - Smallest indicator loading for each construct

[b] Convergent validity

All constructs in this model are conceptualized as reflective, because of the direction of the causality, the interchangeability of the indicators, the covariation among the indicators, and the nomological net of the constructs, which should not differ [48]. In this context, the composite reliability and the convergent and discriminate validity were examined. The composite reliability (also known as internal consistency reliability-ICR) is similar to Cronbach's alpha and measures its internal consistence, except that the latter presumes, a priori, that each indicator of a construct contributes equally (e. g. the loadings are set to unity) [43], [49]. This measure, which is unaffected by scale length, is more general than Cronbach`s alpha, but the interpretation of the values obtained is similar and the guidelines offered by Nunnally [50]. ICR should be 0.70 or higher [51]. Here, ICR (smallest ICR = 0.776) is above the threshold, so that the ICR is given. Convergent and discriminant validity by the average variance extracted (AVE) were assessed. AVE represents the overall amount of variance in the indicators accounted by the latent construct. However, some AVE estimates are below

recommended threshold, yet, research suggests that lower AVE estimates are acceptable for newer scales (e. g. Netemeyer et al. [52]). Overall, the evidence of reliability, convergent validity, and discriminant validity indicates that the measurement model was appropriate for testing the structural model at a subsequent stage. The reflective constructs of the SEM fulfill all of the quality criteria regarding validity and reliability for all four samples (cf. Table 4).

4 Results, Discussion and Limitations

4.1 Results and Discussion

Table 5 shows the hypotheses related path coefficients for each country. The related t-value with its level of significance and if the related hypothesis is supported or not.

Table 5. Overall View of the Results

Hypotheses	Path coefficient				T-Value				Hypothesis supported			
	FIN	GER	USA	JPN	FIN	GER	USA	JPN	FIN	GER	USA	JPN
H1 PEOU positive influences PU	0.623	0.447	0.559	0.493	6.169***	5.713***	4.694***	3.381*	●	●	●	●
H2 PEOU positive influences INTUSE	0.299	0.257	0.292	0.249	1.650°	2.607*	1.968**	2.591*	●	●	●	●
H3 PU positive influences INTUSE	0.390	0.403	0.458	0.447	1.745°	4.839***	2.777*	4.269***	●	●	●	●
H4 TR positive influences PEOU	0.736	0.718	0.641	0.415	9.551***	17.791***	10.248***	3.310*	●	●	●	●
H5 TR positive influences PU	0.288	0.406	0.360	0.335	3.022*	5.283***	3.236*	2.181**	●	●	●	●
H6 TR positive influences INTUSE	0.206	0.308	0.175	0.325	1.255 n.s.	3.707***	1.548 n.s.	3.273*	○	●	○	●

Hypothesis supported = ●; Hypothesis not supported = ○

° denotes significance at the $p < 0.10$ level
* denotes significance at the $p < 0.05$ level
** denotes significance at the $p < 0.01$ level
*** denotes significance at the $p < 0.001$ level

As predicted, $\mathbf{H_1}$ is confirmed for each country. Considering $\mathbf{H_2}$, PEOU would have a positive effect on PU, the results show that H_2 is also supported for each country. $\mathbf{H_3}$: PU is positively related to INTUSE. H_3 is supported for all four countries as well. $\mathbf{H_4}$ is supported for Finland and Germany with the highest path coefficient, followed by the USA and Japan with the weakest path coefficient. $\mathbf{H_5}$: TR will have a positive effect on PU. H_5 is also supported for all four countries with the weakest path coefficient for Finland. $\mathbf{H_6}$: TR will have a positive effect on INTUSE. H_6 is supported for Germany and Japan, but not supported for Finland and the USA. Although the path coefficients of Finland and the USA are positive the t-values are not significant. Overall the TAM with its original constructs (PEOU, PU, and INTUSE) shows almost the same results as previous studies in the field of m-payment [10], [18-21], cf. Figure 2. Companies should pay attention on simple and practical functions while also increasing useful features. These features are important to prevent consumers' frustration if m-payment is difficult to use and it should fulfill the different needs of consumers to reach the broad mass. There is no "one size fits all" approach and the use of technology by consumers is not a foregone conclusion. To achieve this, target companies have to consider an increase in user pretests.

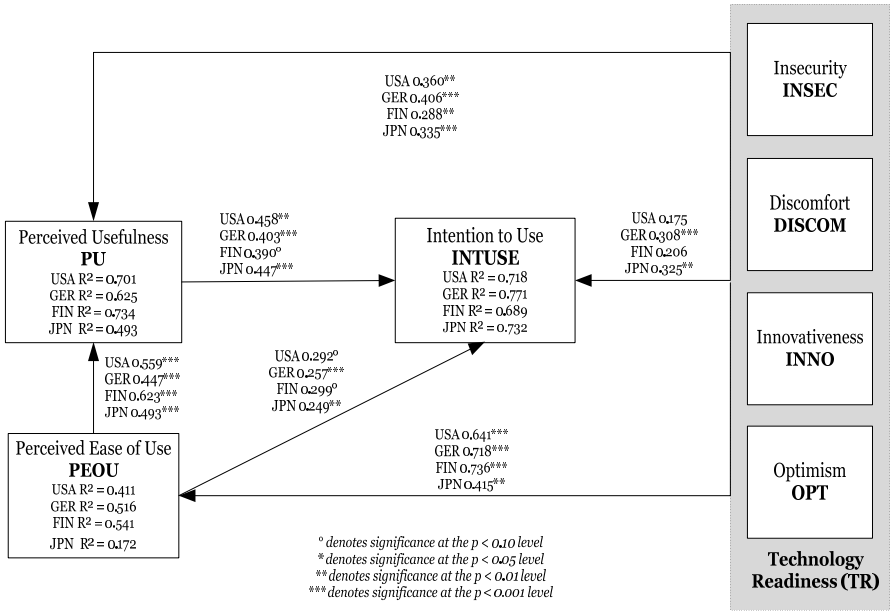

Fig. 2. Modified Research Model – Results

We found out that TR was positively associated with all constructs of TAM for each country and that TAM and TR overall represent suitable approaches to evaluate TA and technology readiness in an international context for m-payment. Supplementary the effect of TR on INTUSE (H_6) for Finland and the USA is not as expected. The relationship between TR and on INTUSE for those both countries is not statistically significant. Figure 2 shows the relationship between the constructs and INTUSE for the four countries. As we introduced in Section 1 the cultural dimensions of Hofstede [53] show significant differences in IDV for the USA, in MAS for Finland and in UAI a slightly difference for Finland and the USA compared to the other countries. It is important to figure out in which way the cultural dimensions are related to TR and INTUSE (H_6). It can be argued that cultures that are more masculine (GER and JPN) will be more technology ready than in less masculine cultures. A further implication concerns the relationship between PU and the INTUSE m-payment. In the Finnish sample this relationship is weak significant while in the German and Japanese sample it is strong significant. This underlines the argument that a perception of a technology's usefulness in the context of m-payment is more significant than in less masculine cultures like Finland. If m-payment providers become familiar with these differences, the more likely they are to create an m-payment solution that meets the needs of the consumer. The current study may serve as a guide for researchers to examine the influence of cultural dimensions towards m-payment. The conceptual framework from this study is applicable for future research on m-payment in different countries. Previous studies have integrated TR on TAM and found out that TR also influences the

acceptance of new technologies [5], [54], [55]. We can assume that TR is an important factor to measure the consumer acceptance of IS. Lin et al. [22] came to the same conclusion towards consumer adoption of e-service systems that TR influences PEOU and PU but is not statistically significant for INTUSE. Due to this TR should also be considered when examine the acceptance of m-payment. TR provides a more comprehensive measurement of the consumers' overall state of mind resulting from a gestalt of mental enablers and inhibitors that collectively determine a persons' predisposition toward technologies [5]. Companies should strengthen positive TR drivers (OPT, INNO) that encourage the use of m-payment. Further, companies have to consider to promote the development of positive attitudes towards m-payment. On the other hand, companies have to reduce TR inhibitors (DISCOM, INSEC) to lower aversion to use m-payment. H4 states out that consumers with a higher TR are less concerned with the adoption of m-payment technology. The more the consumers are enthusiastic with new technologies such as m-payment, the easier it is for them to use. A stronger PEOU will increase the INTUSE m-payment (H_1).

4.2 Limitations

First and foremost, a bias existed because the sample is self-selected. Second, this study considers the adjustment of users in Germany, Finland, the USA and Japan, but other countries might demonstrate notable differences for cultural and economic reasons. Therefore, developing (e. g. Kenia) and newly industrializing countries (e. g. India) should be considered. This study did not directly measure cultural dimensions. For this reason, it is not possible to say that a link between cultural factors and technology as well as technology readiness has been empirically established [23]. Third, it is important to think about the research model and other constructs that influence the acceptance of m-payment, such as network effects [56], and other factors such as psychological or information and system quality or differences in individuals personalities itself, which are factors that affect the success of information systems [57]. Fourth, the survey was only provided in English. This can lead to misunderstandings by the respondents due to language barriers. To avoid these misunderstandings, it has to be considered that the surveys for Germany, Finland and Japan should be written in their native languages. Ultimately, Venkatesh et al. [8] stated out that not all of the variance in consumer's intention can be explained by the current TAM research approach. Lin & Chang [24] recommend to examine qualitative investigations that aim at exploring and capturing the subtleties of consumer behaviors that cannot be directly observed or measured by quantitative research [24].

5 Conclusion and Further Research

From the theoretical point of view, our paper contributes to acceptance research by providing a better understanding of the impacts of factors, particularly technology readiness and therefore acceptance of m-payment in an international context. The importance and potential of m-payment in a modern global society is presented and

given in a status quo for Finland, Germany, the USA and Japan. For this purpose, an extended TAM is carried out. Several techniques are used to validate measurements and examine the model testing. We concentrate on consumer desires and preferences and which aspects of m-payment need to be improved to increase acceptance. This paper provides a better understanding of the impacts of the following constructs technology readiness (innovativeness, optimism, discomfort, and insecurity), perceived usefulness and perceived ease of use on the intention to use m-payment. Factors such as perceived ease of use and perceived usefulness show similarity in all four countries and increase the intention to use m-payment. We can assume that technology readiness is an important factor to measure the consumer acceptance of m-payment and that there are differences in the way individuals adopt and perceive new technologies due to their cultural background. This study reveals some features and effects and may be valuable to business organizations in the m-payment sector. As organizations internationalize, there is a growing need to understand how cultural factors might affect the adoption of m-payment. Our results suggest future research for constructs related to our model. Future research in the context of m-payment has to note socio-cultural differences, because this field has not been considered sufficiently.

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