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A Meta-Analysis of the UTAUT2 in the Field of Mobile Financial Services

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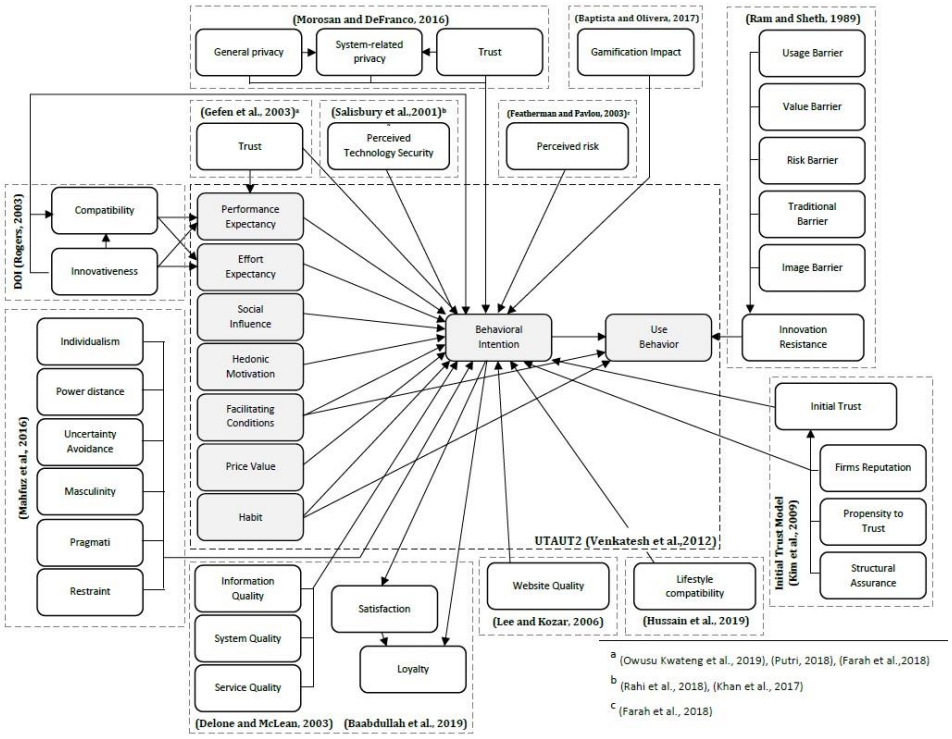

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Abstract

Mobile services and mobile financial services become more and more popular in everyday life. Therefore, acceptance and adoption of mobile financial services are critical for the success of a financial company. We provided a comprehensive review of quantitative results from literature regarding mobile financial service adoption. With the help of a meta-analytical approach, the empirical findings of 21 studies were aggregated in order to analyze the summarized effects. We present a theoretical model to give a fundamental base for further studies and research directions in this field. This model indicated that performance expectancy and habit have a positive impact on the behavioral intention to use mobile financial services. Moreover, together with facilitating conditions the adoption and acceptance usage behavior towards mobile financial services will also be increased. Our study provides important insights about the customer's behavior and develop a general understanding of mobile financial services.

Keywords

Meta-Analysis, UTAUT2, Mobile Services, Financial Services

1. Introduction

Today, mobile devices have an important part in our daily life and are omnipresent. They enable together with applications simplifying and speeding up processes (Baptista & Oliveira 2017). Especially in the banking sector traditional processes have been changed through novel technologies and services, e.g. mobile banking. Likewise, customer behavior and needs have also changed significantly. Furthermore, fulfillment of customer needs is one of the main goals for companies (Baptista & Oliveira 2017, Rahi et al. 2018). It is of particular interest to recognize the crucial factors to satisfy customers and the successful adoption of those services. A growing body of literature has examined the adoption and acceptance behavior of people towards information systems. However, there is no meta-analysis that particularly uses the Unified Theory of Acceptance and Use of Technology 2 model of Venkatesh et al. (2012) as a central point and also focuses on mobile financial services. With support of this meta-analysis, these research interests will be fulfilled and a basis for further approaches generated. Thus, the work orientates on the following research question:

What is the aggregated effect of UTAUT2 constructs from literature regarding mobile financial service adoption?

In the first place, this means to conduct a meta-analysis of the relationships of the UTAUT2 constructs in order to investigate the aggregated effect. With the knowledge gained, a better understanding of the adoption towards mobile financial services will be achieved. With this, conclusions can be drawn about possible factors and their influences, which can also be used for further studies in this area. The structure of this work is as follows: The second section provides a fundamental theoretical knowledge. This includes at first a general understanding of mobile financial services. Then technology acceptance models will be presented, especially the UTAUT2 model from Venkatesh et al. (2012). Afterwards a brief look into the literature will be given. The third section starts with the explanation of research method and selection of literature for the subsequent meta-analysis. The meta-analysis in the fourth section is divided into examining construct reliabilities, correlation and path coefficient. With the discussion in section five the results will be reviewed. Furthermore, limitations of the analysis will be discussed and possible thoughts on further studies presented. Section six summarizes the results and draws conclusions.

2. Theoretical Framework

2.1. Mobile Financial Services and Related Literature

The opportunity to offer a wide range of services to bank customers has increased enormously through novel technology in the sector of mobile devices. Additionally, the mutual relationship between financial institution and customers has changed dramatically in the last decades by new forms of communication, e.g. mobile applications (Junglas et al. 2008, Luo et al. 2010). The first section of this paper will explain financial services controlled by mobile devices and subsequently classify different forms of it.

A mobile financial service is a product or service of a bank or any other financial institution, that provides the opportunity to accomplish commercial transactions by a mobile device remotely. The interaction between customer and financial organization is set up by a mobile software, for instance, an application on the smartphone of the user (Yen & Wu 2016). Mobile financial services are carried out in different types: checking bank accounts, conducting financial transactions, doing payments or receiving text message alerts (Lee et al. 2012). Furthermore, many banks or financial institutions are providing unique solutions of their services and products bundled in an application for their customers. Those individual solutions also lead to the fact that the abovementioned financial services affiliate with each other. In detail this means, that terms and functions like mobile banking or mobile payment are closely related and can sometimes go along together in one application. Especially the relationship between both is a critical point for further questions and discussions (Shaikh & Karjaluoto 2015). For example on one hand, a mobile banking application often includes services in order to conduct payments. On the other hand, mobile payment represents an independent service that does not mandatory require a bank as a service provider (Tiwari et al. 2007). With support of Figure 1 a deeper understanding will be realized.

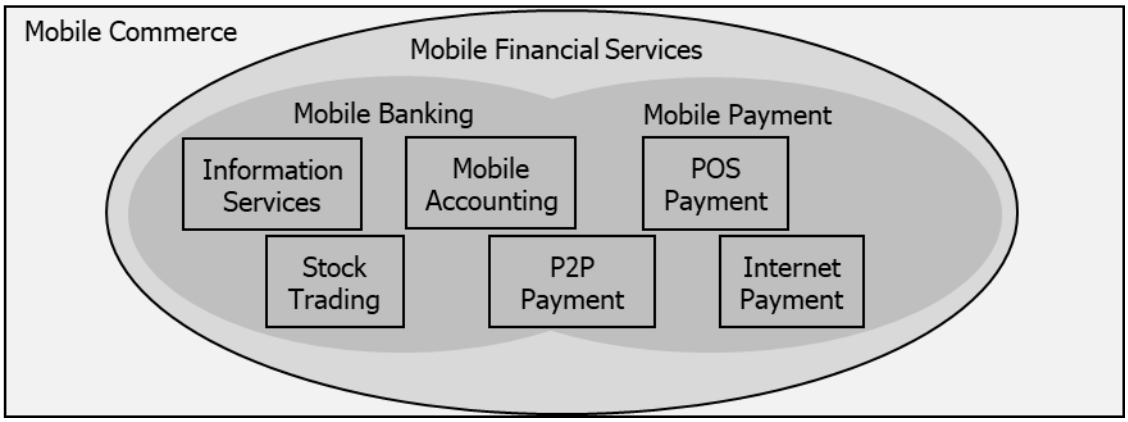

Figure 1: Mobile Financial Services, own representation

Since financial services are usually known as mobile financial services in the mobile commerce area, they are centered within the mobile commerce field illustrated in Figure 1. It is evident that there is a distinction between mobile banking and mobile payment, which needs to be discussed for further theoretical considerations. For instance, Peer-to-Peer (P2P) payment services belonging, as already mentioned before, to both mobile financial service categories. Again, the German Sparkasse provides the P2P payment service KWITT within their mobile banking application, which enables money transfers between their customers (Sparkasse 2019).

The term mobile banking implies the opportunity for application user and bank customers to communicate with their financial institution anywhere and at any time via mobile devices in order to execute their personal interests (Luo et al. 2010, Shaikh & Karjaluoto 2015). Moreover, this also implies the mobile access to different banks, accounts and other financial services instead of physically visiting a bank (Gu et al. 2009, Luo et al. 2010). In contrast, the definition of mobile payment is described by Dahlberg et al. (2008: 165) as follows: "Mobile payments are payments for goods, services, and bills with a mobile device (such as a mobile phone, or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies."

As both services are overlapping but slightly different, the number of players is another crucial point to distinguish them. Mobile banking includes the interaction between customer and bank. On the other hand, mobile payment displays a relationship between customer, bank and an additional merchant (Oliveira et al. 2016). But also a third party could be the intermediary between customer and merchant, so that a bank does not necessarily have to be involved (Shaikh & Karjaluoto 2015).

2.2. Technology Acceptance Models

Research on understanding an individual's adoption and acceptance towards information systems usually refers to technology acceptance models. Widely used in research and one of the most relevant models was developed by Davis (1989), the "Technology Acceptance Model (TAM)". Based mainly on previous research and the work of Fishbein and Ajzen "Theory of Reasoned Action (TRA)" (Fishbein & Ajzen 1975, 1980), TAM includes the constructs ease of use and usefulness in their model. After extensions and upgrades of the TAM, Venkatesh et al. (2003) developed the "Unified theory of acceptance and use of technology (UTAUT)". As previous models, it also attempts to understand the behavioral intention and subsequently usage behavior towards an information system. Venkatesh et al. (2003) identified four constructs that have been relevant for individuals in order to adopt a certain information system: performance expectancy, effort expectancy, social influence and facilitating conditions. Additionally, the UTAUT model was extended by Venkatesh et al. (2012) to the UTAUT2. This model added the constructs hedonic motivation, price value and habit to the originally designed UTAUT model of Venkatesh et al. (2003). Figure 2 illustrates the UTAUT2 model with the already mentioned constructs. In addition to those, the moderators age, gender and experience influence the causal relationship to behavioral intention and use behavior, respectively.

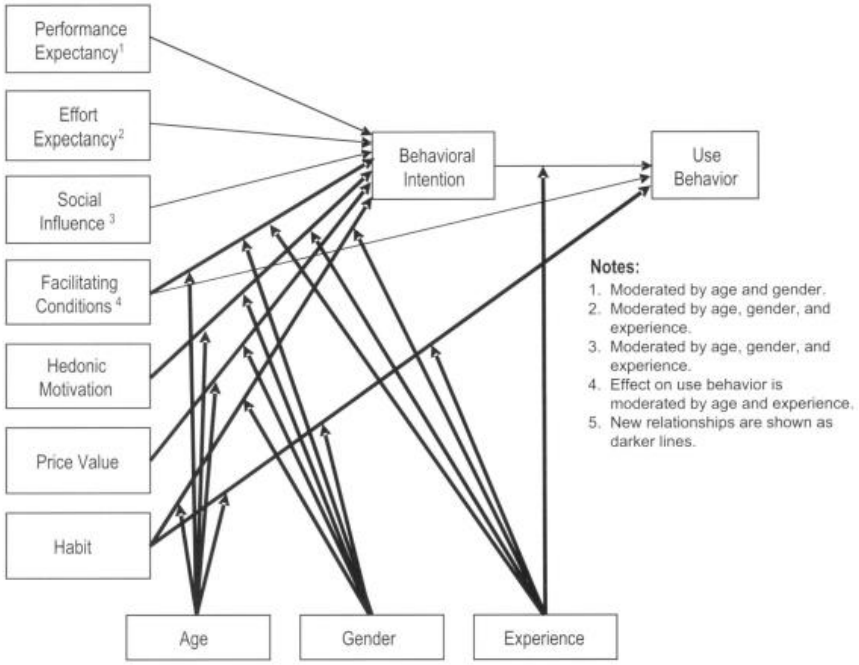

Figure 2: UTAUT2 Model (Venkatesh et al., 2012: 160)

Table 1 shows the definition of each construct of the UTAUT2 model.

Table 1. Definitions of UTAUT2 constructs		
Construct	**Definition**	**Source**
Performance Expectancy	"[..]the degree to which an individual believes that using the system will help him or her to attain gains in job performance."	Venkatesh et al. (2003: 447)
Export Expectancy	"[..]the degree of ease associated with the use of the system."	Venkatesh et al. (2003: 450)
Social Influence	"[..]the degree to which an individual perceives that important others believe he or she should use the new system."	Venkatesh et al. (2003: 451)
Facilitating Conditions	"[..]the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."	Venkatesh et al. (2003 453)
Hedonic Motivation	"[..]the fun or pleasure derived from using a technology[..]"	Venkatesh et al. (2003 161)
Price Value	"[..]consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them[..]."	Venkatesh et al. (2003 161)
Habit	"[..]is a perceptual construct that reflects the results of prior experiences."	Venkatesh et al. (2012: 161)

2.3. Related Literature on UTAUT2

In order to extend the fundamental knowledge about mobile financial services, a short literature review about recent research in this sector is supportive. Also a review of studies with UTAUT2 as a research model will be of fundamental importance for the purpose of this paper.

A major research work was created by Dahlberg et al. (2008) in form of a literature review regarding mobile payment research. They build a framework of market and contingency factors that influenced the mobile payment service market. In particular, the market factor consumer power is highly relevant for this study. Most of the studies were based on the TAM and the Diffusion of Innovation (DOI) theory of Rogers (1995). In addition to those models, constructs like cost, compatibility, trust, convenience, or security were added. As a result, they mentioned the importance of a detailed investigation of the factors for a successful adoption. Moreover, they highlighted the relevance of the consumer perspective of mobile payments. The authors re-developed their work a couple of years later and presented their recent findings (Dahlberg et al. 2015). Again, most of the studies focused on technology and consumer adoption of mobile payment services. In this study, the UTAUT and UTAUT2 model raised the interest of researchers more than before.

In a similar way, Shaikh & Karjaluoto (2015) presented a comprehensive literature review about mobile banking adoption. The authors primarily analyzed studies that examined consumers' motivation to use mobile banking services. In this review, TAM and UTAUT were identified as one of the most used theories for analyzing acceptance. As a conclusion Shaikh & Karjaluoto (2015) stated that compatibility, perceived usefulness and attitude are the crucial factors for a successful adoption. However, a limitation of this study mentioned by the authors is that mobile banking covers a much broader spectrum, this includes not only consumer aspects but also infrastructure, technology and innovation.

Besides the established acceptance models, the UTAUT2 of Venkatesh et al. (2012) became more and more fashionable in recent research. In the work of Baptista & Oliveira (2015), moderators of Hofstede (1980) were also added to the UTAUT2 model. The authors argued about this because of the lack of cultural factors in acceptance models. In order to measure the mobile banking adoption in their study, they conducted a survey in Mozambique and achieved a sampling distribution of 252 people. It revealed that especially from the UTAUT2 model performance expectancy, hedonic motivation and habit are the most relevant factors for the behavioral intention of consumers.
Another related research approach to analyze mobile banking adoption was created by Alalwan et al. (2017). Their examination of Jordanian bank customers' acceptance has indicated that performance and effort expectancy, hedonic motivation, price value and trust also have statistically significant relationships to the behavioral intention. Additionally, behavioral intention and facilitating conditions have a significant impact on the successful adoption.
Moreover, Slade et al. (2015), Oliveira et al. (2016), and Baabdullah et al. (2019) have found similar findings. All of them have used the UTAUT2 model and conducted questionnaires in their regional areas (e.g. Saudi Arabia, Portugal and United Kingdom) as a quantitative research method. The most critical drivers of a successful adoption are performance expectancy, social influence and habit. In spite of those UTAUT2 constructs, research model extensions showed that perceived risk, perceived technology security or trust are also relevant predictors.

3. Research Methodology

For the purpose of this study, a meta-analysis was conducted to investigate the adoption and acceptance behavior of customers regarding mobile financial services. A meta-analysis is a powerful method in order to pool empirical findings of several studies (Jak 2015, Paré et al. 2015). In more detail, it takes quantitative data of different papers and measures the standard effect more precisely than an individual study. A systematic review, on the contrary, is a more narrative and subjective review of empirical studies whereas a meta-analysis combines the findings statistically in respect of different goals (Paré et al. 2015). Paré et al. (2015) formulated the particular aims of a meta-analysis. Before starting with the meta-analysis, necessary literature has to be examined. The review of relevant literature orientates on predefined rules. They are described as follows:

1. The study is an empirically orientated study.
2. The study is a quantitatively orientated study.
3. The study investigates adoption and acceptance of customers towards mobile financial services (This includes research of mobile banking and mobile payment).
4. The study uses the technology acceptance model UTAUT2.

Based on the coding rules different literature data bases and platforms (ScienceDirect, Emerald, JSTOR, GoogleScholar and the catalog of Technische Informationsbibliothek (TIB)) were scanned by using subsequent keywords: "mobile financial services", "mobile payment", "m-payment", "mobile banking", "m-banking", "acceptance", "adoption", "UTAUT2" and "Unified Theory of Acceptance and Use of Technology 2". Only studies which use structural equation models, correlation and regression paths were considered. Furthermore, the relevant studies have to exhibit standardized path

weights as well as sample sizes. Any study that does not include the considered aspects, was excluded from the investigation. Moreover, the relationship between habit and behavioral intention was not considered due to insufficient data. With respect to the before mentioned aspects, a total number of 21 studies was identified. That indicates a total sampling dimension of 7937. As shown in Table 2, the studies vary in a time frame from 2015 until 2019 and are distributed over the entire globe.
Besides the UTAUT2 constructs, several other constructs were also added to the research models of the listed studies. Appendix A illustrates an overview of those constructs and declares the relationship towards UTAUT2 constructs and respectively, the behavioral intention. However, the figure does not consider effects of moderator variables.

Table 2. Relevant studies for Meta-Analysis

No	Author	Year	Journal	Country	Sampling dimension
1	Arenas-Gaitán	2015	Journal of Internet Banking and Commerce	Spain	474
2	Baptista & Oliveira	2015	Computers in Human Behavior	Mozambique	252
3	Alalwan et al.	2016	Information Systems Management	Jordan	323
4	Mahfuz & Khanam	2016	PICMET [c]	Bangladesh	115
5	Mahfuz et al.	2016	ICEEOT [b]	Bangladesh	300
6	Megadewandanu et al.	2016	ICST [a]	Indonesia	372
7	Morosan & DeFranco	2016	International Journal of Hospitality Management	USA	794
8	Oliveira et al.	2016	Computers in Human Behavior	Portugal	301
9	Alalwan et al.	2017	International Journal of Information Management	Jordan	343
10	Baptista & Oliveira	2017	Internet Research	Brazil	326
11	Khan et al.	2017	Journal of Global Information Management	Pakistan	328
12	Alalwan et al.	2018	Journal of Retailing and Consumer Services	Jordan	348
13	Farah et al.	2018	International Journal of Bank Marketing	Pakistan	385
14	Putri	2018	ICoICT [d]	Indonesia	507
15	Rahi et al.	2018	Accounting	Pakistan	398
16	Baabdullah et al.	2019	International Journal of Information Management	Saudia Arabia	429
17	Goularte & Zilber	2019	International Journal of Bank Marketing	Brazil	400
18	Hussain et al.	2019	International Journal of Bank Marketing	Bangladesh	247
19	Owusu Kwateng et al.	2019	Journal of Enterprise Information Management	Ghana	300
20	Raza et al.	2019	Journal of Islamic Marketing	Pakistan	229
21	Sivathanu	2019	Journal of Science and Technology Policy	India	766

a ICST = 2016 2nd International Conference on Science and Technology-Computer
b ICEEOT = 2016 International Conference on Electrical, Electronics, and Optimization Techniques
c PICMET = 2016 Portland International Conference on Management of Engineering and Technology
d ICoICT = 2018 6th International Conference on Information and Communication Technology

4. Meta-Analysis Approach

4.1. Construct Reliabilities

To begin with, a meta-analysis can be carried out either on a random effect or fixed effect basis. The random effect expresses that all relevant studies have a similar effect size, but that this effect varies from study to study. Possible reasons for these deviations are characteristic differences in the sample distribution. For instance, education and age of respondents will affect the effect size. Based on these considerations, it will be assumed that the effect sizes are represented by a random sample from a particular distribution (Borenstein et al. 2010). On the other hand, a fixed effect specifies that there is a super population with a solely true effect (Field 2003). For this analysis the random effect was chosen, because of a random sample distribution with different individual studies. The meta-analysis begins with an examination of the construct reliabilities. Afterwards it analyzes the correlations and then the path coefficients of the UTAUT2 constructs. At the end the summarized empirical findings will be completed by critically reviewing them in the next section.
Construct reliability was calculated by simply taking the weighted average of the Cronbach alpha according to the studies sample size. Table 3 illustrates the results. Since not every study has presented their reliabilities in detail, only a total of 19 studies were reviewable. Moreover, some of the studies excluded single constructs of the UTAUT2 model due to own considerations, so that the number varies between the constructs. Especially the fact that the studies analyze the adoption towards the behavioral intention leads to a small number of studies in the usage behavior column. As reported by Straub (1989), a value above 0.7 implies good reliability. Since all of the constructs show results above 0.8, a high reliability is given.

Table 3. UTAUT2 construct reliabilities

	PE	EE	SI	FC	HM	PV	HB	BI	UB
Average reliability [a]	0.88	0.89	0.88	0.83	0.87	0.86	0.88	0.90	0.81
Minimum	0.77	0.73	0.76	0.68	0.71	0.78	0.69	0.78	0.73
Maximum	0.97	0.96	0.97	0.92	0.98	0.96	0.95	0.98	0.89
Standard Deviation	0.064	0.069	0.070	0.075	0.076	0.057	0.058	0.064	0.052
Number of studies	19	19	19	19	19	15	16	17	6[b]

a Average reliability calculated by Cronbach alpha.
b One study used a single item measure (Cronbach alpha = 1) and was therefore not included.

4.2. UTAUT2 Correlations

After analyzing the UTAUT2 constructs regarding reliability, the meta-analysis continues with studying the correlation between the constructs. Table 4 illustrates the results of this part.
Since again not every paper provided the relevant tables and data for the analysis, the number of studies varies from 13 to 17. According to this, the total sample size fluctuates in the same way.

Table 4. Summary of correlation of UTAUT2 constructs									
	PE-BI	EE-BI	SI-BI	FC-BI	HM-BI	PV-BI	HB-BI	FC-UB	BI-UB
No. of studies	17	17	17	17	17	15	14	13	13
Total sample size	6382	6382	6382	6382	6382	4822	5415	4501	4546
Average (r)	0.613	0.516	0.459	0.444	0.525	0.457	0.563	0.356	0.488
Z-value	10.03	14.88	8.63	9.08	6.95	5.73	6.73	5.36	5.39
p (effect size)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Q-value	478.53	138.40	312.58	260.03	666.95	505.36	508.24	270.89	493.85
p (heterogeneity)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
95% Low (r)	0.518	0.459	0.366	0.357	0.396	0.314	0.400	0.232	0.327
95% High (r)	0.692	0.570	0.543	0.522	0.633	0.580	0.648	0.469	0.621

For the review of the correlations, the average Pearson correlation coefficient of all studies was considered first and foremost. This is displayed as the average (r) in the table. To test the significance and calculate the average r, the correlations were first transformed to Fisher's Z and then tested regarding their effect sizes. Reason for this procedure is that the correlation coefficient cannot be interpreted as an interval-scaled measure and therefore have to be transformed to an approximately normally distributed size. All relationships revealed that their correlational effect sizes are significant. The results have indicated that the relationship between performance expectancy and the behavioral intention is particularly strong with 0.613. On the contrary, the lowest correlation is between the constructs facilitating conditions and usage behavior with 0.356. But this knowledge may result from the small number of studies that have built the relationship between the mentioned constructs. Moreover, the other constructs are roughly in a similar range between 0.44 and 0.56. The confidence level was set at 95 %. This observation showed that the confidence interval for effort expectancy and behavioral intention varies in a narrow range between 0.459 and 0.570. In contrast to that, all other relationships displayed much wider ranges. For instance, facilitating conditions and behavioral intention towards usage behavior with 0.232 to 0.469 and respectively 0.327 to 0.621. Here again, the small number of studies could be problematic for the calculation and interpretation. This problem will be further elaborated and discussed in the next section.

In order to test the heterogeneity for using the random effects model, the Q-values were also computed. Thereafter, the p-value was tested for homogeneity. In all cases the results showed a significant homogeneity. This also leads to the conclusion that a random effect model is not adequate for conducting a meta-analysis in this work. The homogeneity test checks the null hypothesis for whether it has a zero value for the interaction error term or not. However, since this term suggests the fixed effects model, this insight should be viewed with caution. This point is also critically discussed in research, since the decision on which model is used, is not exclusively dependent on the test of homogeneity (Borenstein et al. 2010, Knippschild et al. 2015). In particular, the small number of studies might lead to a possible distortion of the results and a biased decision. Nevertheless, the already predetermined decision to use a random effect model will not be changed and the meta-analysis will continue as discussed.

Furthermore, the analysis also looks at the distribution and frequency of the correlations for every single relationship. This is illustrated in Appendix B. In support

of the presented histograms, further insights about the distribution of the correlations and possible outliers in the data are visualized. Most of the studies indicated similar correlations, so that the histograms showed similar patterns. Exceptions to this are the relationships between price value and behavioral intention, and behavioral intention to usage behavior. There were also outliers in the data showing negative correlations (e.g. performance expectancy, social influence, and hedonic motivation towards to the behavioral intention to use mobile financial services). These negative correlations (e.g. -0,05, -0,18 and -0,08) are another possible cause for the large ranges of the confidence intervals. In addition, the mean was computed according to the sample size and added together with the standard deviation to the histograms below.

4.3. UTAUT2 Path Coefficients

Especially this part of the analysis is of particular interest to research and science in order to understand acceptance and adoption behavior. Since correlations only indicate in which directions the relationships of the constructs are going, but do not determine how much they affect each other, path coefficients will also be considered. To examine these, King & He (2006) suggested two options. This study will meta-analyze path coefficient directly, instead of calculating them in support of the correlations. Nonetheless, both approaches show similar results according to King & He (2006). The results are summarized in Table 5, which has the same structure as the one in the previous section. Indirect influences of the relationships were also taken into account in the calculation.

Table 5. Summary of path coefficients of UTAUT2 constructs

	PE-BI	EE-BI	SI-BI	FC-BI	HM-BI	PV-BI	HB-BI	FC-UB	BI-UB
No. of studies	20	19	19	15	19	18	16	8	15
Total sample size	7508	6714	7034	5828	7034	5948	6193	2569	5190
Average (ß)	0.228	0.125	0.103	0.049	0.151	0.102	0.277	0.192	0.422
Z-value	6.80	3.86	3.99	1.43	3.58	3.15	5.14	6.235	6.14
p (effect size)	0.000	0.000	0.000	0.153	0.000	0.002	0.000	0.000	0.000
Q-value	160.94	124.12	81.74	90.91	221.58	103.77	275.70	16.72	380.11
p (heterogeneity)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000
95% Low (ß)	0.164	0.062	0.053	-0.018	0.069	0.039	0.174	0.132	0.297
95% High (ß)	0.291	0.187	0.153	0.115	0.231	0.164	0.374	0.250	0.533

Here again, the number of studies is different, since not every study has taken over the original relationships of the UTAUT2 model. The low number of 8 studies for the relationship between facilitating conditions and usage behavior is critical for further analyses.
First, the z-values were again examined and tested for effect size. All relationships except facilitation conditions towards behavioral intention showed highly significant results, where the relationship between price value and behavioral intention was statistically significant only at the level $p<0.05$. Since the effect size between facilitation conditions and behavioral intention is non-significant, an interpretation is not justified. As a second step, the homogeneity and heterogeneity were also examined, which gave similar insights as in the previous section.

In the same way as King & He (2006) proceeded, the analysis of the path coefficients will focus mainly on the results illustrated in the histograms. These are shown in Appendix C. The strongest means indicate performance expectancy (mean 0.23 st.dev.: 0.15) and habit (mean: 0.28 st.dev.: 0.21) towards behavioral intention, and behavioral intention directed to usage behavior (mean 0.41 st.dev.: 0.22). However, it also should be stated that the standard deviation is the highest for the last two. In contrast, the standard deviations for the relationships from effort expectancy (mean: 0.14 st.dev.: 0.13), social influence (mean: 0.12 st.dev.: 0.10) and facilitating conditions (mean: 0.07 st.dev.: 0.12) to behavioral intention are much lower. This may also be due to the proven normal distribution of the path coefficients, whereas all other histograms roughly show uniform distributions. The small standard deviation from facilitating conditions towards behavioral intention (mean: 0.19 st.dev.: 0.08) was not particularly considered as already mentioned because of the small number of studies. To sum up, it is recognizable that all path coefficients have positive relationships, although individual studies have reported negative coefficients. This is indicated by the specified minimum statistics. However, this leads to the conclusion that the impact of those is lower for the calculation of the aggregated effect.
In addition to previous results about effect sizes, a weight analysis similar to Baptista & Oliveira (2016) was conducted to support findings and acknowledge further insights about path coefficients and their significance. With support of the weight analysis, further statements about crucial predictors in this case for the behavior towards mobile financial services will be made (Jeyaraj et al. 2006). Table 6 illustrates the number of significant and non-significant relationships. The weight was computed by dividing the number of significant relationships by the number of total studies that included the considered relationships. A weight value of 1 implies that all relationships are significant. On the other hand, a value of 0 indicates no significant relationship at all.

Table 6. Summary of significant construct relationships

	PE-BI	EE-BI	SI-BI	FC-BI	HM-BI	PV-BI	HB-BI	FC-UB	BI-UB
No. of studies	20	19	19	15	19	18	16	8	15
Sig.	15	12	10	6	13	11	12	6	14
Non-Sig.	5	7	9	9	6	7	4	2	1
Weight	0.75	0.63	0.53	0.40	0.68	0.61	0.75	0.75	0.93

In their work, Jeyaraj et al. (2006) stated different types of relationships based on the frequencies examined in literature. Since the UTAUT2 model of Venkatesh et al. (2012) with related constructs is widely and successfully applied, this aspect will not be considered. It is much more interesting to look at whether a construct is a ”best predictor” (weight greater than 0.80) or ”promising predictor” (weight equal to 1) (Jeyaraj et al. 2006). For this analysis, the definition of ”best predictors” was extended to a weight greater than 0.75 in order to review more predictors. As a result, no ”promising predictor” were identified. Instead, four ”best predictors” were determined, namely performance expectancy (0.75), habit (0.75), facilitating conditions (0.75), behavioral intention (0.93) towards behavioral intention and respectively usage behavior.

5. Discussion and Limitations

Based on the results of the foregone meta-analysis, a theoretical model was developed. The inclusion of the constructs and the corresponding relationships are based on the knowledge gained from the meta-analysis.

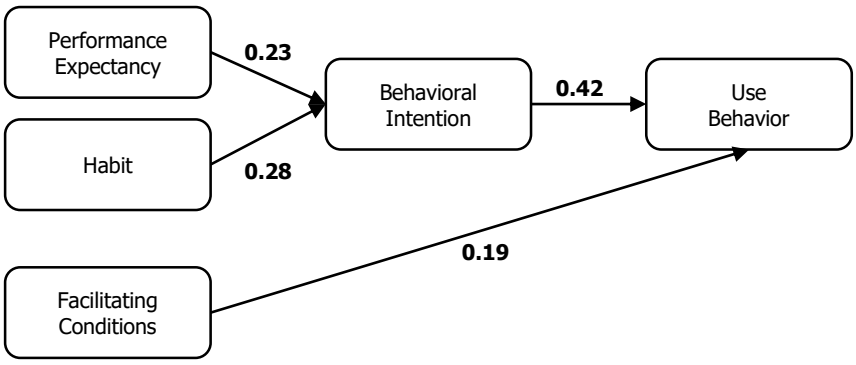

Figure 3: Theoretical Model, own representation

Furthermore, only constructs and relationships that met the weight analysis criteria were included. The path coefficient results from the meta-analysis. First, the effects of UTAUT2 constructs were computed through the meta-analysis in order to answer the research question. Then ”best predictors” were determined, giving a general understanding of the behavior towards mobile financial services. It has been shown from the reviewed literature that performance expectancy, habit and facilitating conditions are crucial factors for mobile device users. Mobile financial services make traditional processes much easier and faster for users. For instance, instead of visiting a bank to fulfill money transfers, a user could do this from home and also 24 hours a day through mobile banking applications. This location-based independent aspect makes performance expectancy among other supporting aspects to an important construct towards the behavioral intention. Furthermore, the path coefficient of 0.23 indicates the positive relationship between both. All studies that indicated a significant relationship here, have also reported a positive path coefficient. This evidence clarifies that the general view in literature about performance expectancy goes in the same direction. In a likewise manner, habit also indicated a positive relationship with a slightly larger path coefficient of 0.28. Since mobile financial services are partly established in the daily lives of users, usual behavior and attitudes towards these technologies have already been developed. Both constructs, performance expectancy and habit, affect the behavioral intention positively, which then again has a positive influence on the usage behavior. This 14path coefficient is the strongest in the theoretical model with 0.42. In addition, facilitating conditions also have a positive influence on the usage behavior. As mentioned before, mobile financial services have evolved enormously in recent times and became more common. This also includes the development of associated infrastructure (e.g. point of sale terminals), which as a result leads to a higher acceptance and adoption. The path coefficient between facilitating conditions and usage behavior is in comparison to other coefficients lower with 0.19. Besides the new empirical findings, this study also has limitations, which have to be noted. As already mentioned, the small number of studies (21) leads to

results that are not sufficiently precise. For instance, with a higher number of relevant articles the confidence intervals of the aggregated effects would have been more narrow. Moreover, with more studies the sample size would have increased. But on the other hand, it has to be considered, that not every study measures the same effect and could therefore not be included. For this work, certain criteria have been defined and taken into account during the collection of literature. Another limitation were the results of the test for heterogeneity, since they suggested to use a fixed effect model instead of the used random effect model. The decision on the right model for this analysis was based on the assumption that all studies measured the same effect size, but varied due to different characteristics in the sample. Therefore, the meta-analysis was continued with the random effect model. The last limitation considers a more general critic of meta-analyses. Through a publication bias not all studies will be summarized since they are not published due to non- significant results. Also this meta-analysis deals with this problem, because individual studies did not provide path coefficients if they were non-significant. Nonetheless, the limitations enable opportunities to improve and extend this study. First, instead of only considering UTAUT2 studies, the predefined rules could be loosened up in order to review more studies. This means that other acceptance models like TAM or UTAUT could be taken into account and additional relationships could be investigated. But also other constructs like trust, perceived risk or quality-related constructs could be relevant for analyzing the behavioral intention towards mobile financial services. The benefit of extending this research is that more studies are now being considered and thus more accurate results may be achieved. Moreover, since no moderator effects were considered in this study, this states another opportunity to extend this research. In particular, to analyze differences of ages, education, or sex and the resulting effect towards the behavioral intention could be of interest.

6. Conclusion

This work provided a comprehensive review of quantitative results from literature regarding mobile financial service adoption. With the help of a meta-analysis the empirical findings of 21 studies were aggregated in order to analyze the summarized effects. Additionally, a theoretical model was created to give a fundamental base for further studies in this field. This model indicated that performance expectancy and habit have a positive impact on the behavioral intention to use mobile financial services. Moreover, together with facilitating conditions the adoption and acceptance usage behavior towards mobile financial services will also be increased. But also interesting insights about the distribution of empirical findings were made through the visualization of the histograms. Initial findings for the further analysis have already been obtained here. Besides the empirical findings, limitations were discussed and suggestions for further research approaches were made. To sum up, this study reviewed and summarized literature about acceptance and adoption behavior towards mobile financial services. The analysis also provided important insights about the customer behavior and developed a general understanding of mobile financial services.

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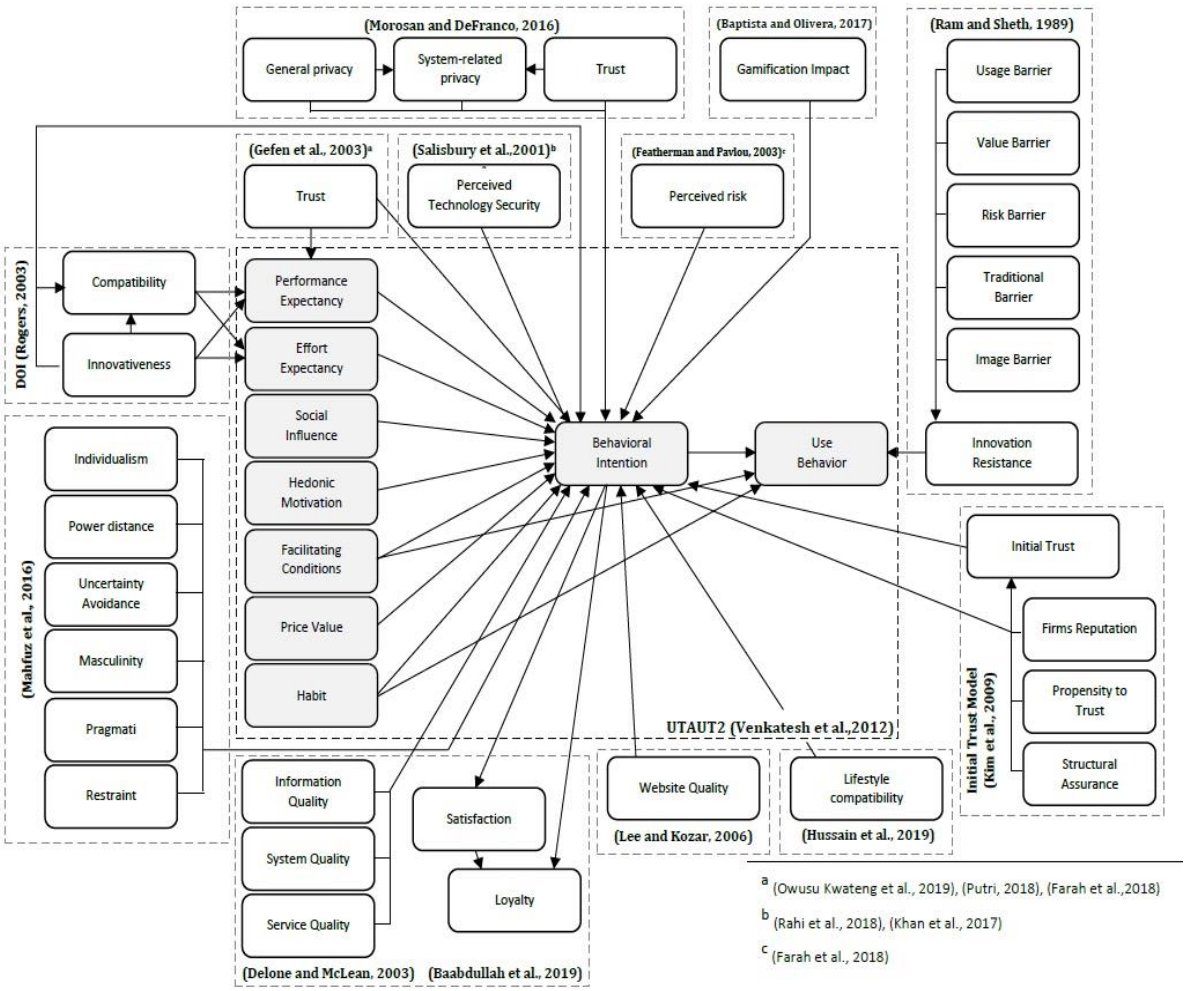
Appendix

Appendix A. Additional Constructs of Research Model

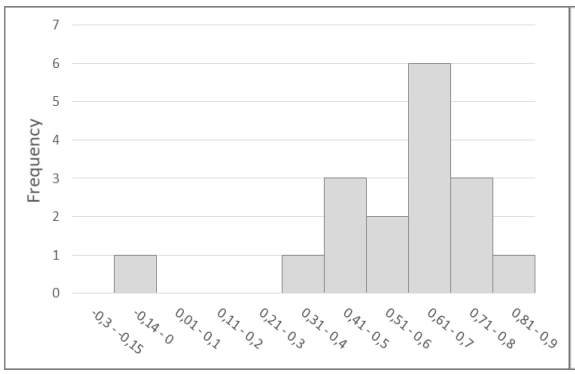


[a] (Owusu Kwateng et al., 2019), (Putri, 2018), (Farah et al.,2018)

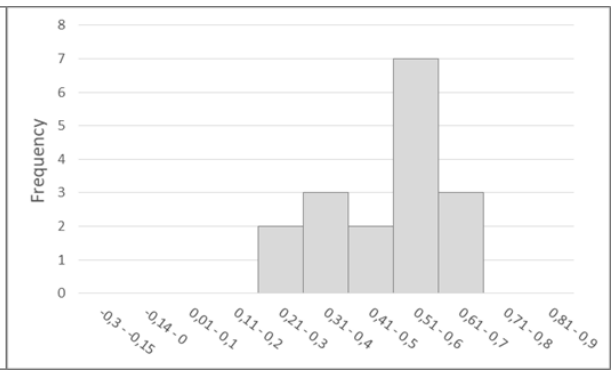
[b] (Rahi et al., 2018), (Khan et al., 2017)

[c] (Farah et al., 2018)

Appendix B. Histogram of Correlations



PE ► BI
Mean: 0.63 St.Dev.: 0.21
Min: -0.05 Max: 0.83



EE ► BI
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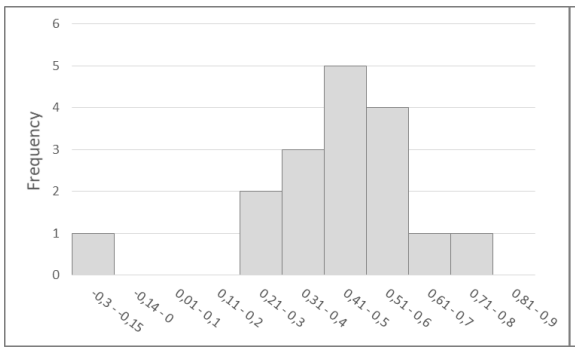
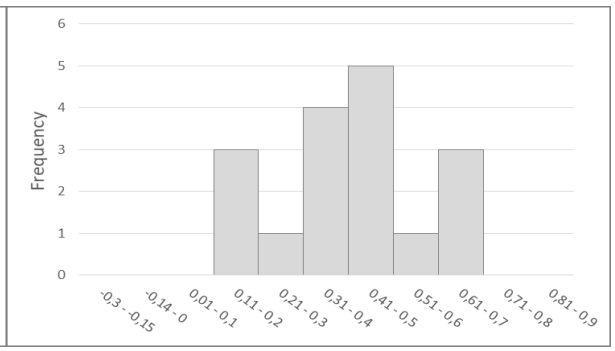
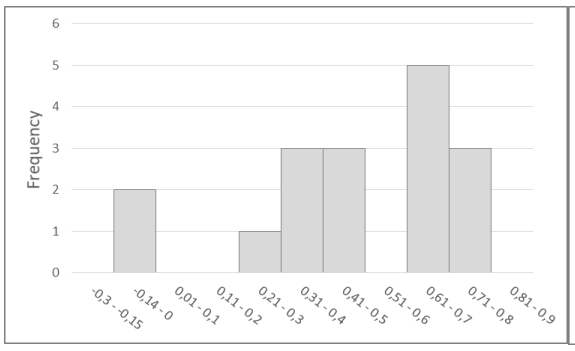
Min: 0.30 Max: 0.68



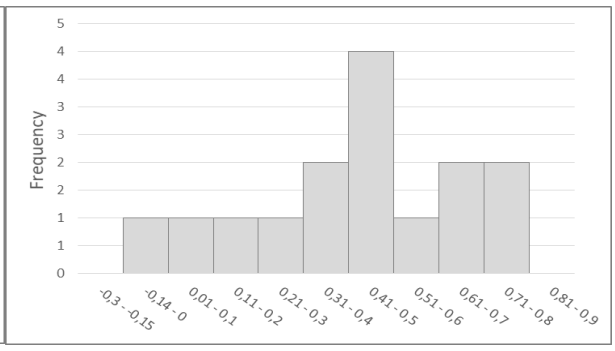
SI ► BI
Mean: 0.46 St.Dev.: 0.20
Min: -0.18 Max: 0.75



FC ► BI
Mean: 0.44 St.Dev.: 0.17
Min: 0.15 Max: 0.70

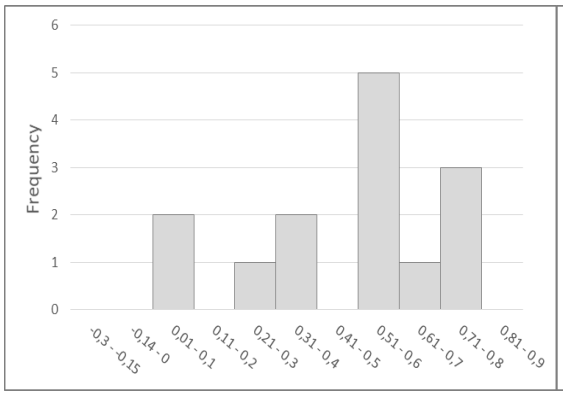


HM ► BI
Mean: 0.53 St.Dev.: 0.25
Min: -0.08 Max: 0.80



PV ► BI
Mean: 0.44 St.Dev.: 0.25
Min: -0.10 Max: 0.76

Appendix B. Histogram of Correlations (continued)



HB ► BI
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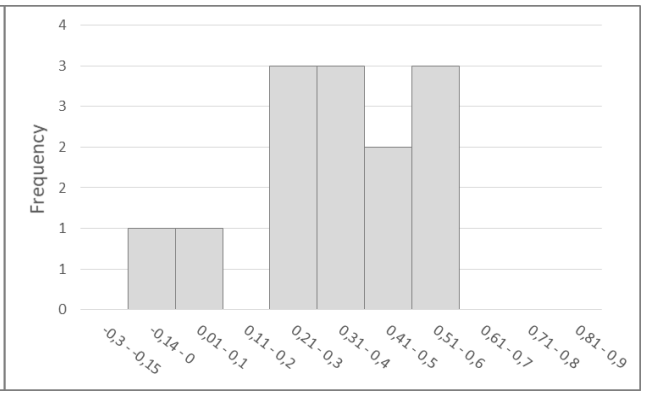

FC ► UB
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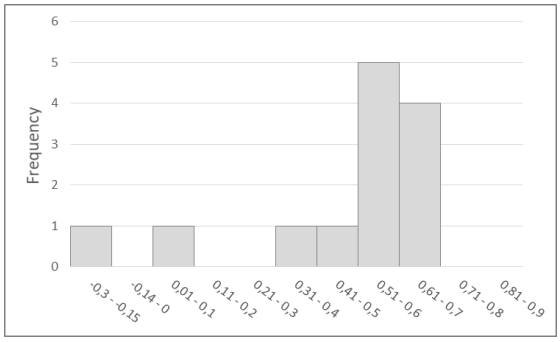
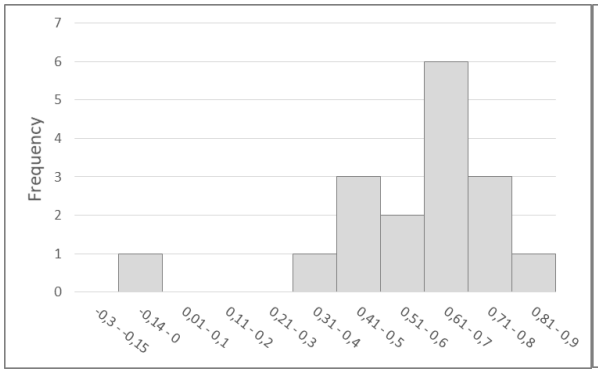


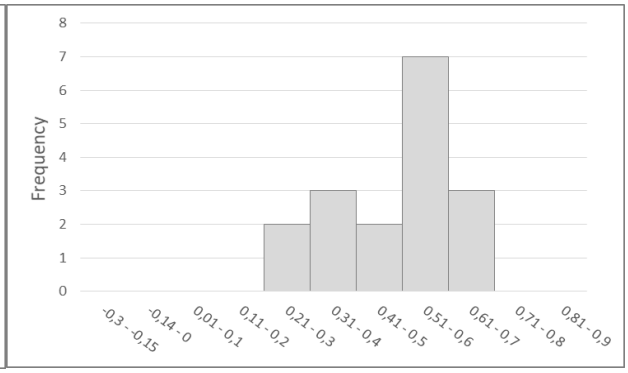
BI ► UB
Mean: 0.38 St.Dev.: 0.29
Min: -0.29 Max: 0.71

Appendix C. Histograms of Path Coefficients



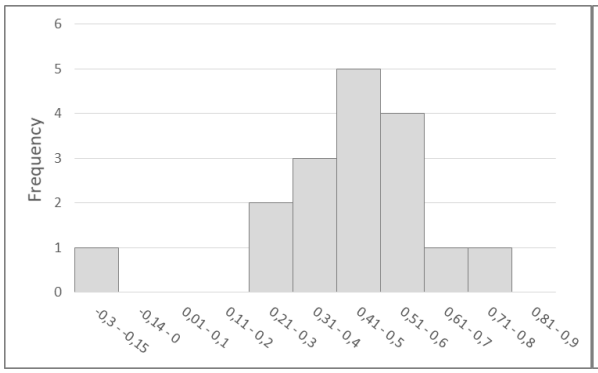
PE ► BI

Mean:	0.63	St.Dev.:	0.21
Min:	-0.05	Max:	0.83



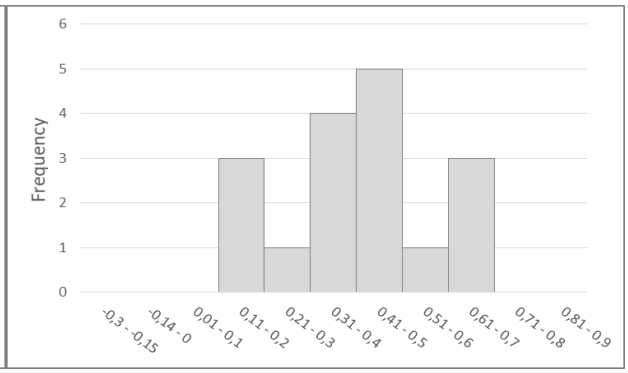
EE ► BI

Mean:	0.50	St.Dev.:	0.12
Min:	0.30	Max:	0.68



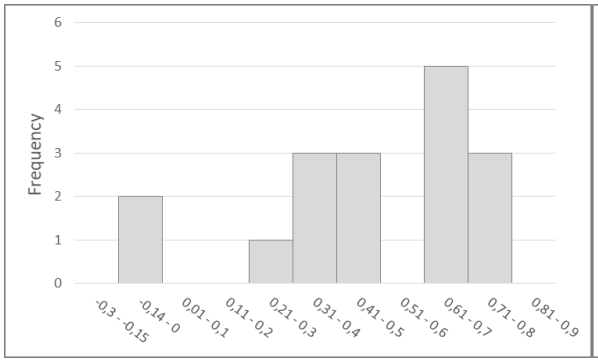
SI ► BI

Mean:	0.46	St.Dev.:	0.20
Min:	-0.18	Max:	0.75



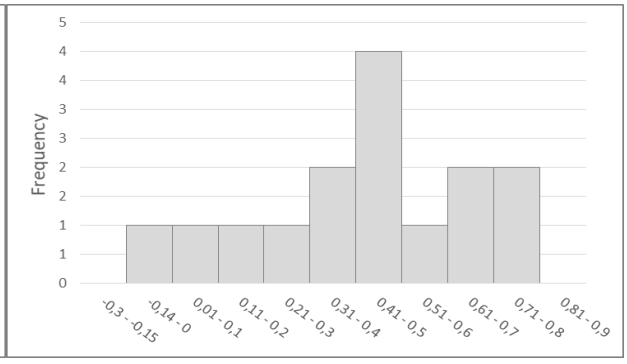
FC ► BI

Mean:	0.44	St.Dev.:	0.17
Min:	0.15	Max:	0.70



HM ► BI

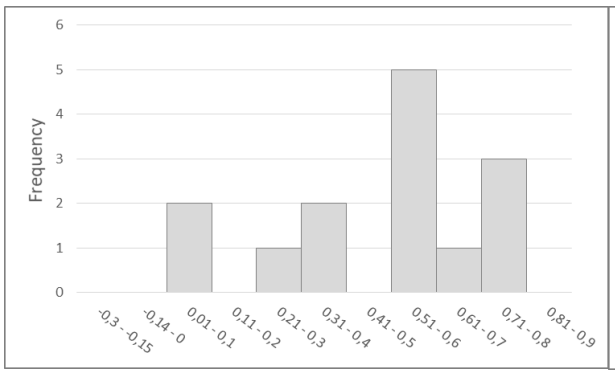
Mean:	0.53	St.Dev.:	0.25
Min:	-0.08	Max:	0.80



PV ► BI

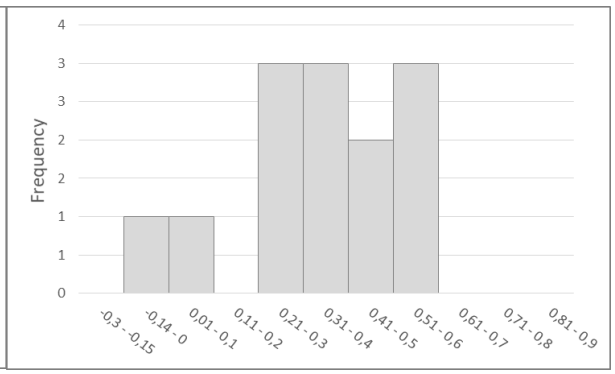
Mean:	0.44	St.Dev.:	0.25
Min:	-0.10	Max:	0.76

Appendix C. Histograms of Path Coefficients (continued)



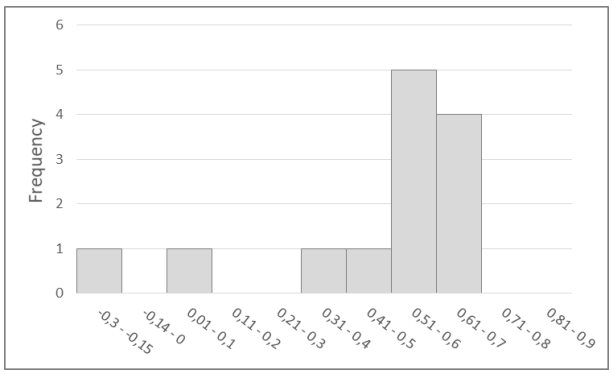
HB ► BI

Mean:	0.52	St.Dev.:	0.24
Min:	0.04	Max:	0.79



FC ► UB

Mean:	0.30	St.Dev.:	0.21
Min:	-0.12	Max:	0.59



BI ► UB

Mean:	0.38	St.Dev.:	0.29
Min:	-0.29	Max:	0.71

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