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Social Aspects in Technology Acceptance: Theory Integration and Development

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Abstract
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Keywords: Technology Acceptance, Social Aspects, UTAUT, MATH

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Theory Integration and Development

Abstract

The success of many new technologies and technology-based applications relies heavily on considering social factors. Contemporary models for technology acceptance either neglect social aspects or cover them in a superficial way. In our study we develop a better understanding of social aspects in technology adoption. We analyze and combine items related to social influence from the Unified Theory of Acceptance and Use of Technology and the Model of Adoption of Technology in Households and develop a new research model. While testing this model using quantitative data (n=501), one derived construct appears to be weak. Hence, we introduce new items, provide a second round of data collection (n=682), and develop an improved research model, which is validated by the new data. Here, all constructs work as intended. Our second model has a higher coefficient of determination than the first one. We show that Social Externalities is the most influential social factor towards technology acceptance and provide the corresponding items for future research.

Keywords

Technology Acceptance, Social Aspects, UTAUT, MATH

1. Introduction

Nowadays the internet and other Information and Communication Technologies become increasingly embraced by individuals (Vannoy & Palvia, 2010). The term information society has been coined for this phenomenon (Duff, Craig, & McNeill, 1996; Machlup, 1962). The internet has become an indispensable way for people to obtain critical information for both their business and personal needs. It also creates new ways for citizens to communicate, aggregate, and share information of a social nature and will obviously continue to change the way we live. While technology may influence society, social factors affect behavior of an individual towards technology acceptance (Vannoy & Palvia, 2010). In our study we take a closer look at this complex, delicate, and very important global phenomenon.

Although social influence on technology acceptance behavior has been widely acknowledged, there is little research that approaches comparative discussion of social constructs, and to our knowledge, no models have been developed to provide an integrated view. At the same time, social aspects are underlying in manifold constructs used in several technology acceptance theories. In our study we concentrate on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, G. B. Davis, & F. D. Davis, 2003) and the Model of Adoption of Technology in Households (MATH) (Venkatesh & Brown, 2001). We consider these two theories as being among the most comprehensive and advanced ones in contemporary technology adoption research. As social constructs of UTAUT and MATH are not yet integrated and discussed comparatively, there exists a possibility to combine these theories and create a new and improved model.

Hence, the main objective of this study is to provide a better understanding of social aspects in technology adoption through integration and development of existing theories. Therefore, the following research questions are addressed:

RQ1 How do distinct social constructs from technology acceptance theories relate to each other?

RQ2 What social constructs are able to best explain technology acceptance?

Our research questions imply focusing solely on social aspects of technology adoption. Other prominent predictors, such as perceived ease of use or perceived usefulness (F. D. Davis, 1986), are not considered in our study, as they are not covered by its objectives.

During the study we develop a unified research model on the influence of social factors on the intention to use a technology (Behavioral Intention, BI). The BI construct is included as a traditional dependent variable in the adoption of any technology (Ajzen, 1991; F. D. Davis, 1986; Fishbein & Ajzen, 1975; Venkatesh et al., 2003). Prior studies show that the intention to adopt a certain technology is a good predictor of real adoption.

In order to derive a comprehensive understanding of social constructs influencing BI we studied the items used in the prior UTAUT and MATH models. We combined these items and generated a first research model, which, however, turned out to be flawed while testing it using quantitative data (phase I). Therefore, the new items were introduced and a second research model was created and tested in a subsequent study (phase II). The new model suggests that the social aspects of

technology adoption can be fully explained by such previously existing and newly introduced constructs as Social Conformance, Secondary Sources' Influences, Social Status, Social Facilitating Conditions, and Social Externalities. The elaborated model is verifiable, as each of its constructs is measured by multiple items taken either from underlying theories or developed during the study.

Therefore, the developed model posits to inform current knowledge by integration, structuring, and expansion the social-related constructs from current technology acceptance theories into a unified view. The model provides a novel way to examine technology adoption and serves to increase current knowledge of social influence. Moreover, the study reveals that Social Externalities is the most influential among social factors of technology acceptance.

The internet was considered in our study as an example of technology, as it is used as an instrument not only for tasks implementation, but also for communication with virtual community, which is related to affective aspect of life (Armstrong & Hagel, 1996).

The remainder of the paper is structured as follows. After this introduction, previous research on the influence of social aspects on human behavior towards use of technology, as well as social constructs in MATH and UTAUT are discussed. We then give the detailed description of the study we have conducted. For each of the two study phases we provide applied research design, elaborated research model, and derived results. Study overview precedes introduction of its first phase and the refinement of the research model goes before examination of the second study phase. Implications for theory and practice, as well as limitations and the areas of

future research are provided in the conclusion and discussion section at the end of the paper.

2. Theoretical Background

2.1. Previous Studies on Social Influence and Technology Acceptance

General influence of social factors on individual's behavior has been thoroughly investigated since the second half of the 20th century. One of the first studies in this field belongs to Herbert C. Kelman in 1958 (Kelman, 1958). He investigated the ways external inputs, such as information communicated, can bring changes in individuals' attitude. Kelman distinguished between three different processes of social influence that affect individual behavior: compliance, identification, and internalization (Kelman, 1958). In social psychology and sociology the social influence could be defined as "change in an individual's thoughts, feelings, attitudes, or behaviors that results from interaction with another individual or a group" (Rashotte, 2007).

Technology adoption has long been of interest in Information Systems (IS) research to predict and explain user behavior. Such research has important implications for practice, e.g. in the areas of product design and development, as well as in marketing and sales (Vannoy & Palvia, 2010). Literature provides multiple theories and models that have potential to explain the process of technology adoption. One of the most prominent of them is the Technology Acceptance Model (TAM) (F. D. Davis, 1986, 1989). However, its fundamental constructs ("Perceived Ease of Use" and "Perceived Usefulness") disregard social aspects, which was one of the reasons for critics and further expansion. In most of the sequential theories in this field the

social factors are considered as important direct or indirect determinants of intention to use a system (BI) (Mazman, Usluel, & Çevik, 2009). In different studies on technology adoption such constructs have been called Subjective Norm (e.g. the Theory of Planned Behavior, TPB) (Ajzen, 1991), Social Factors (the Model of Personal Computer Utilization) (Thompson, Higgins, & Howell, 1994), etc.

With the introduction of UTAUT (Venkatesh et al., 2003) the fragmented view on technology acceptance shifted to a unified view. Eight major theories and models in the considered area (such as TAM, TPB, the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), the Innovation Diffusion Theory (Rogers, 1995), etc.) were integrated in UTAUT. The authors argue that the constructs used in previous studies to capture the essence of social influence provided inconsistent results. E.g. the Subjective Norm construct has only a significant influence on technology acceptance under mandatory (and not voluntary) settings and its effect diminishes as users gain more experiences with the system (Venkatesh & F. D. Davis, 2000). Therefore, Venkatesh et al. articulated the link between social aspects and technology acceptance in the four items of the Social Influence (SI) construct (SI1, SI2, SI3, and SI4) and in one of the items of the Facilitating Conditions (FC) construct (FC4). Details of these constructs and measurement items are provided in Table 1.

Table 1: Social Constructs in UTAUT

Core Construct	Definition	Items[a]
Social Influence (SI) (Venkatesh et al., 2003)	The degree to which an individual perceives that important others believe he or she should use the internet.	SI1: People who influence my behavior think that I should use the internet.
		SI2: People who are important to me think that I should use the internet.
		SI3: A high proportion of people from of my social environment use the internet.[b]
		SI4: In general, my peers have supported the use of the internet.
Facilitating Conditions (FC) (Venkatesh et al., 2003)	The degree to which an individual believes that circumstantial and technical setting exists to support use of the internet.	FC4: I know someone who is available for assistance with internet-related difficulties.

a All items were measured using a 7-point Likert scale.
b The SI3 item was modified to fit the purpose of the study.

While UTAUT is the theory to explain technology adoption in organizations, MATH (Venkatesh & Brown, 2001) is aimed at capturing the nature of technology acceptance in households. During a longitudinal study of personal computer usage in households (Venkatesh & Brown, 2001) the key constructs were identified and then used in a comprehensive multi-item measurement model. MATH presents factors influencing household technology adoption by using TPB as the framework. MATH proposes the four social related constructs: Friends And Family Influences (FAFI), Workplace Referents' Influences (WRI), Secondary Sources' Influences (SSI), and Status Gains (SG). Please refer to Table 2 for details.

Table 2: Social Constructs in MATH

Core Construct	Definition	Items[a]
Friends And Family Influences (FAFI) (Venkatesh & Brown, 2001)	The extent to which friends and family members influence behavior.	FAFI1: My friends think I should use the internet at home.
		FAFI2: Those in my social circle think I should use the internet at home.
		FAFI3: My family members think I should use the internet at home.
		FAFI4: My relatives think I should use the internet at home.
Workplace Referents' Influences[b] (WRI) (Taylor & Todd, 1995)	The extent to which coworkers, colleagues, party or club members influence behavior.	WRI1: My colleagues (work, clubs, political parties, etc.) think I should use the internet.
		WRI2: My acquaintances think I should use the internet.
Secondary Sources' Influences (SSI) (Venkatesh & Brown, 2001)	The extent to which information from TV, newspaper and other secondary sources influences behavior.	SSI1: Information from newspapers suggests that I should use the internet at home.
		SSI2: Information that I gather by watching TV encourages me to use the internet at home.
		SSI3: Based on what I have heard on the radio, I am encouraged to use the internet at home.
Status Gains (SG) (Venkatesh & Brown, 2001)	The increase in prestige that coincides with the internet usage.	SG1: People who use the internet at home have more prestige than those who do not.
		SG2: People who use the internet at home have a high profile.
		SG3: Using the internet is a status symbol.

a All items were measured using a 7-point Likert scale.
b The items for workplace referents' influences were modified to fit the purpose of the study.

There are numerous studies on adoption of particular technologies, especially internet, which usually apply one of the general models and theories presented above (Arendsen & Wijngaert, 2011; F. D. Davis, 1986, 1989; Niehaves & Plattfaut, 2010, 2011; Venkatesh et al., 2003).

2.2. Social Constructs in UTAUT and MATH

Tables 1 and 2 represent the constructs related to the measurement of social factors towards technology (in our case, the internet) adoption derived from both MATH and UTAUT.

As stated above, several items from the two UTAUT constructs, SI and FC, can be considered as "social". We transferred the three SI measurement items from the original theory (SI1, SI2, and SI4), while the SI3 item ("The senior management of this business has been helpful in the use of the system") was substituted by a more acceptable one with an evenly high loading (Venkatesh et al., 2003). The FC construct has only one item applicable for our study (FC4).

As illustrated in Table 2, we determined the four social constructs in MATH: FAFI, WRI, SSI, and SG. Each construct is measured by two to four items. For the WRI construct we opted for modification of the original items ("My coworkers think I should use the internet at home" and "My peers at work think I should use the internet at home") making them more expressive and suitable for our study.
As the effects of any non-social factors were not in the focus of attention within our study, we did not include them.

According to both UTAUT and MATH, the key constructs defined above are direct determinants of intention to use a technology (Table 3). In both theories the BI concept is employed for examining both users and non-users. In the case of users it should be interpreted as their intention to continue using a certain technology. BI as a dependent variable has also been employed extensively in earlier technology adoption research (Ajzen, 1991; F. D. Davis, 1986; Fishbein & Ajzen, 1975).

Table 3: Items for Behavioral Intention		
Core Construct	Definition	Items
Behavioral Intention (BI) (F. D. Davis, 1986; Taylor & Todd, 1995; Venkatesh et al., 2003)	The degree to which an individual will want to use the internet for personal activities.	BI1: I intend to use the system in the next 3 months.
		BI2: I predict I would use the system in the next 3 months.
		BI3: I plan to use the system in the next 3 months.

3. Study Overview

Our study consists of two distinct phases (Figure 1). After reviewing and integrating the constructs related to social aspects from existing technology acceptance theories (MATH, UTAUT), the first phase was started. Here, we generated a questionnaire, collected data, analyzed it using exploratory factor analysis, and, as a result, created a research model. This model was tested with the collected data. Afterwards, we refined the model to overcome deficiencies. In study phase II we collected data in another location, conducted one more factor analysis to derive a new research model, and tested it with the new data. The new data was also applied to the first research model to verify the outcomes.

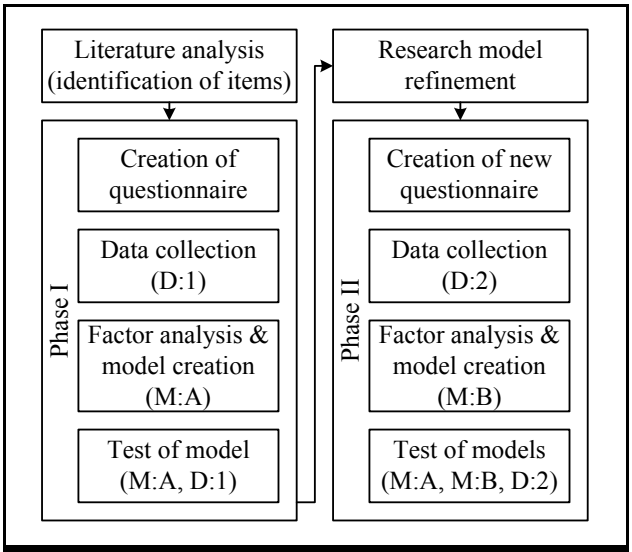

Figure 1. Study Overview

4. Study Phase I

4.1. Research Design

Based on the constructs presented in the previous section, we created a questionnaire aimed at developing a firm understanding of social factors influencing the intention to adopt a certain technology. As a basic technology with great adoption among the population we chose the internet. In order to validate the questionnaire, we conducted a pilot study (n = 7), which resulted in positive feedback and, thus, no changes were made in the set of questions, items, or constructs. This questionnaire was used to gather data within a medium-sized city (roughly 35,000 inhabitants) located in Western Europe between September and October 2009.

We employed three different data-gathering strategies. First, we extracted contact data of 1,500 citizens (random selection) out of the cities resident registration. Each

selected person received a personal letter from the mayor declaring the aim of the questionnaire and containing the questionnaire itself together with a stamped return envelope. Second, we placed additional 1,500 questionnaires at local libraries and the city's town-hall. Third, we called slightly more than 100 randomly chosen people and interviewed them via phone. In order to lever the response rate we raffled three material prizes among all respondents. Other measures to promote our study included a press conference with the mayor to announce the start of the survey and an issue of another press release in the middle of the data collection phase. This has led to good coverage of our survey in the local media. All in all, we received 503 filled questionnaires, i.e. the response rate was about 1.5%. The respondents are both internet users and non-users. An additional non-response analysis did not reveal any biases.

The sample demographics of the analyzed sample are summarized in the Table 4.

Table 4: Demographics of the Dataset 1	
Gender – Male (%)	40.12
Internet adopters (%)	91.85
Age (average, years)	45.19
Age (standard deviation, years)	16.54

We analyzed our data using two unique steps. First, we used explorative measures to create our research model. Using SPSS 17.0.0 software package we applied a factor analysis approach (Jolliffe, 2002) to the collected data related to social aspects from UTAUT and MATH. The main intention here was to reconfirm prior theory (as presented above). Second, we analyzed the influence of the identified constructs employing partial least squares (PLS) modeling (Chin & Dibbern, 2010; Henseler, Ringle, & Sinkovics, 2009; Marcoulides, Chin, & Saunders, 2009) and using such software package as SmartPLS 2.0 (M3) (Ringle, Wende, & Will, 2005).

While running the PLS algorithm we employed the centroid weighting scheme, as it does not tend to slightly overestimate effects comparing to factor weighting scheme (Wilson & Henseler, 2004). Our datasets include some missing values, which were treated using the mean replacement algorithm (Afifi & Elashoff, 1966).

4.2. Research Model

In study phase I we started to analyze our results using explorative factor analysis. The Kaiser criterion was employed as a standard measure for selection of factors. It assumes choosing all the factors with eigenvalues greater than 1 (Kaiser, 1960), which in our case yielded in the identification of four factors. Three of these factors are apparent (Table 5): Social Conformance (SC), Secondary Sources Influence (SSI), and Social Status or Status Gains (SS). The SC cluster comprises items related to the social pressure from the people close to an individual and is similar to the Subjective Norm construct (Ajzen, 1991). The main idea is that these people can influence individual's behavior towards internet usage. The following items from UTAUT and MATH are included here: FAFI1, FAFI2, FAFI3, FAFI4, SI1, SI2, WRI1, and WRI2. The SSI cluster deals with the mass media influence towards individual's technology acceptance and repeats the SSI construct from MATH having such items as SSI1, SSI2, and SSI3. The SS cluster is related to the SG construct from MATH and involves the SG1, SG2, and SG3 items. At the same time, the last set of items (FC4, SI3, and SI4) has major deficiencies. First, the factor loadings of SI3 and SI4 (Table 5) are rather low (a common threshold is .5). Second, the group consists of factors that appear to have nothing in common. Hence, this cluster requires improvement and will be called "Other" in further analysis.

Table 5: Rotated Component Matrix (Dataset 1)

Item	1	2	3	4
FAFI1	.868	.137	.123	.079
FAFI2	.865	.167	.157	.078
FAFI3	.824	.208	.084	.133
FAFI4	.771	.027	.054	.157
SI1	.768	.119	.174	-.004
SI2	.817	.235	.230	.121
WRI1	.684	.293	.125	.086
WRI2	.836	.239	.153	.112
SSI2	.241	.862	.143	.139
SSI3	.242	.832	.190	.057
SSI1	.226	.819	.160	.049
SG1	.197	.111	.796	.121
SG2	.103	.217	.780	.077
SG3	.183	.113	.741	.115
FC4	-.043	-.022	-.004	.844
SI4	.326	.117	.264	.573
SI3	.154	.127	.127	.560

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Extraction based on Kaiser criterion.

As a result of this explorative factor analysis we derived a research model A to explain BI using four distinct social factors described in the previous paragraph (Figure 2).

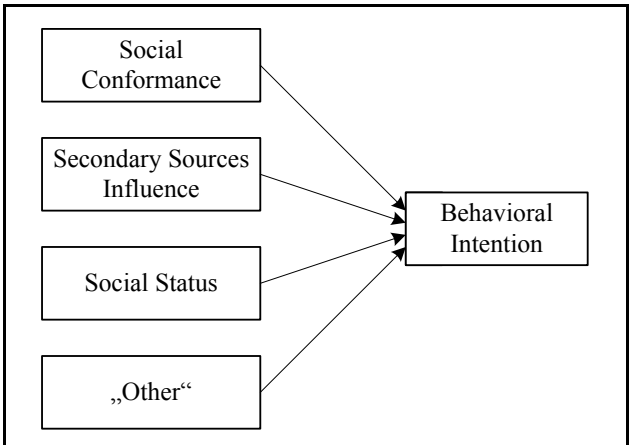

Figure 2. Research Model A

4.3 Results

Regarding the outer model in phase I we can observe high and significant item loadings for all the items used, except for FC4 of the construct "Other" (Table 6), which confirms the outcomes of the prior factor analysis. Significance values were calculated using bootstrapping (500 iterations).

Table 6: Item Loadings (Model A, Dataset 1)

LV	Item	Data 1
BI	BI1	.9386 ***
	BI2	.8033 ***
	BI3	.9291 ***
SC	SI1	.7872 ***
	SI2	.8442 ***
	FAFI1	.8770 ***
	FAFI2	.8757 ***
	FAFI3	.8281 ***
	FAFI4	.7469 ***
	WPRI1	.7578 ***
	WPRI2	.8624 ***
SSI	SSI1	.8785 ***
	SSI2	.9065 ***
	SSI3	.8738 ***
SS	SG1	.7908 ***
	SG2	.6976 ***
	SG3	.8708 ***
Other	FC4	.3557 ***
	SI3	.8521 ***
	SI4	.6783 ***

Inadequacy of the "Other" construct is underpinned by the analysis of Cronbach's Alpha or internal consistency reliability (ICR, see Table 7). In comparable studies an ICR above .9 is considered as excellent, one between .7 and .9 as high, one between .5 and .7 as moderately high, and one below .5 as low (Hinton, Brownlow, & McMurray, 2005). For our items the reliabilities are excellent or high, except the ICR of .43 for the construct "Other", which is a signal for problematic construct

validity. Furthermore, for all constructs the square roots of the shared variance between constructs and measures are higher than the inter-construct correlations. This is an indicator for convergence and discriminant validity (Fornell & Larcker, 1981).

Table 7: Measurement Model (Model A, Dataset 1)

		ICR	Mean	S-Dev	1	2	3	4	5
1	Behavioral Intention	.87	5.57	2.05	.89				
2	Social Conformance	.93	4.08	1.21	.25	.82			
3	Secondary Sources Influence	.86	4.37	1.36	.28	.47	.89		
4	Social Status	.72	3.75	1.26	.18	.37	.40	.79	
5	Other	.43	5.42	1.03	.41	.37	.35	.32	.66

a) ICR: Internal consistency reliability (Cronbach's Alpha)
b) Diagonal elements of the 1-5 columns are the square roots of the shared variance between the constructs and their measures
c) Off-diagonal elements of the 1-5 columns are correlations between constructs

For the inner model only two out of four paths were shown to be significant (Table 8): the influence of secondary sources on the intention to use the internet is about .135 and the influence of the "Other" construct is .3419. Thus, our problematic variable turned out to have the highest impact, which makes its further investigation necessary. Overall, our model can explain about 20% of the variance in usage intention.

Table 8: Path coefficients and R^2 (Model A, Dataset 1)

R^2	.1938
R^2adj	.1873
Social Conformance	.0680
Secondary Sources Influence	.1349 *
Social Status	-.0100
Other	.3419 **

5. Research Model Refinement

Both our factor analysis and the application of the PLS algorithm showed that the construct “Other” is not consistent and not easy to understand. However, it yields high explanatory power to the dependent variable. Therefore, it requires further examination.

In order to understand the “Other” construct we again analyzed its component items: FC4, SI3, and SI4. Here, it is interesting to note that FC4 and SI4 somehow target in the same direction. Both items refer to the support for internet usage from people out of the social network. This finding makes it appropriate to create a new construct closely related to facilitating conditions and dealing with the support of people for personal internet usage. Hence, instead of SI4 we created two new items (Table 9).

Table 9: New Items for Facilitating Conditions

Core Construct	Items
Facilitating Conditions (FC)	FC5: I have a person to contact if I have problems with the internet.
	FC6: There is a person who helps me if I face troubles with the internet.

Moreover, the item SI3 is related to the number of people in the social milieu of the respondent who use the internet. This is closely related to perceived network externalities (PNE) (Katz & Shapiro, 1986; Lu, Deng, & B. Wang, 2010; C.-C. Wang, Hsu, & Fang, 2004) – a construct covering the phenomenon of increase in the value of a certain technology adoption with the growing total number of users (Economides, 1996). In 2010 Lu et al. introduced items to measure PNE (Lu et al., 2010), which we decided to use instead of the SI3 item (compare Table 10).

Table 10: Items for Perceived Network Externalities		
Core Construct	Definition	Items[a]
Perceived Network Externalities (PNE) (Lu et al., 2010)	The degree to which an individual perceives that the value of joining a network increases with the number of members in the network.	PNE1: I estimate that many of my friends are active internet users.
		PNE2: I think that many members of my family use the internet.
		PNE3: I believe that people who are important to me use the internet.
		PNE4: I think that my colleagues (work, clubs, political parties, etc.) use the internet.
[a] All items were modified to fit the purpose of the study		

6. Study Phase II

6.1. Research Design

In the second phase of our study we adapted the questionnaire according to the refinements made. We again organized a pre-test to confirm our translation of the used items. No changes were necessary. The good media coverage of our first study rose attention to it in administrations of several neighboring cities. A manager of an adult education center of one of these cities contacted us and we agreed to conduct our second study in this location. The setting is quite similar and the second city is only around 16 km away from the first one. However, the second city is considerably larger (around 75,000 inhabitants). The study was conducted in 2010 and organized in a very similar way. In the second city we were able to contact 5,000 inhabitants via mail. Moreover, we placed 2,000 questionnaires at the adult education center and the town hall. We again raffled prizes among the respondents. However, these prizes appeared to be less attractive than before. All in all, we

received 682 filled questionnaires. Thus, about .9% of all inhabitants (both users and non-users) participated in our study.

The sample demographics of the Dataset 2 are summarized in the Table 11.

Table 11: Demographics of the Dataset 2	
Gender – Male (%)	45.30
Internet adopters (%)	93.18
Age (average, years)	45.50
Age (standard deviation, years)	16.86

To analyze the data we followed the same procedure as presented in the section 3: First, an exploratory factor analysis to create a new research model and, second, a PLS analysis to gather knowledge on the influence of the identified constructs. Moreover, we tried to confirm the results gained during study phase I by applying the new data to the first research model.

6.2. Research Model

In the second phase of our study we again used the Kaiser criterion to identify the number of constructs (Kaiser, 1960). This time, we were able to identify five unique factors, three of which repeat those of phase I that were easy to interpret: Social Conformance, Secondary Sources Influence, and Social Status. Moreover, the factor analysis confirmed the consistency of our approach on dividing the construct "Other" into two new factors: Social Externalities (SE) (adapted from PNE) and Social Facilitating Conditions (SFC). Here, the factor loadings of all items are highly above the threshold of .5 (Table 12).

Hence, we adapted the original research model and created a new model B, where Behavioral Intention is influenced by the five social factors (Figure 3).

Table 12: Rotated Component Matrix (Dataset 2)

Items	1	2	3	4	5
FAFI1	.818	.151	.026	.212	.148
FAFI2	.832	.221	.100	.062	.050
FAFI3	.781	.189	.110	.008	-.001
FAFI4	.819	.077	.008	.224	.148
SI1	.728	.047	.037	.210	.223
SI2	.864	.127	.015	.229	.149
WRI1	.806	.215	.000	.108	.142
WRI2	.871	.161	.066	.071	.008
PNE1	.159	.820	.107	.034	.029
PNE2	.203	.506	.153	.119	-.148
PNE3	.138	.765	.098	.085	.125
PNE4	.152	.737	.020	-.009	.105
FC5	.045	.148	.923	.100	.040
FC4	.090	.173	.903	.057	.027
FC6	.057	.156	.847	.098	.092
SSI3	.236	.063	.046	.856	.124
SSI1	.295	.063	.094	.837	.154
SSI2	.156	.138	.144	.764	.087
SG1	.148	-.004	.043	.127	.850
SG3	.133	.024	.048	.143	.825
SG2	.193	.147	.077	.062	.726

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Extraction based on Kaiser criterion.

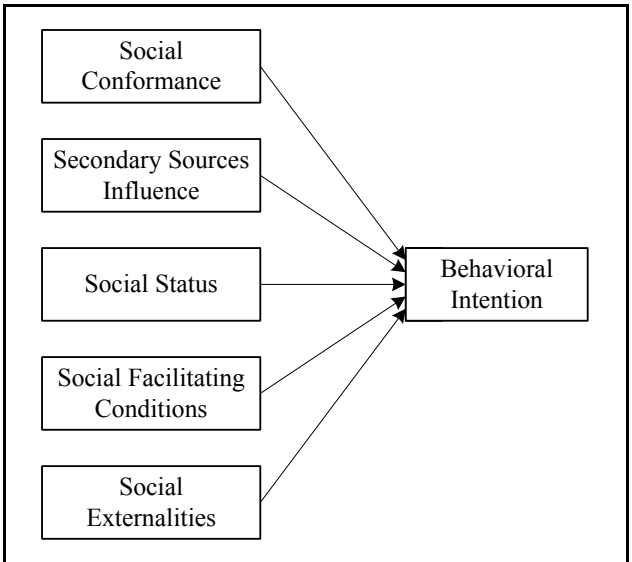

Figure 3. Research Model B

6.3. Results

Using the data collected in the second phase we can, again, show the deficiencies of model A. Although with the new data the "Other" construct performs slightly better, its item loadings, as well as ICR are still lower comparing to other constructs, which indicates the need for a new model (Tables 13 and 14).

Table 13: Item Loadings (Model A, Dataset 2)

LV	Item	Data 2
BI	BI1	.8308 ***
	BI2	.9518 ***
	BI3	.9466 ***
SC	SI1	.7628 ***
	SI2	.9060 ***
	FAFI1	.8728 ***
	FAFI2	.8505 ***
	FAFI3	.7960 ***
	FAFI4	.8656 ***
	WPRI1	.8563 ***
	WPRI2	.8744 ***
SSI	SSI1	.9075 ***
	SSI2	.8388 ***
	SSI3	.8833 ***
SS	SG1	.8942 ***
	SG2	.7549 ***
	SG3	.8178 ***
Other	FC4	.6318 **
	SI3	.7986 ***
	SI4	.6929 ***

Table 14: Measurement Model (Model A, Dataset 2)

		ICR	Mean	S-Dev	1	2	3	4	5
1	Behavioral Intention	.90	6.31	1.17	.91				
2	Social Conformance	.94	4.93	1.28	.25	.85			
3	Secondary Sources Influence	.85	4.62	1.29	.25	.42	.88		
4	Social Status	.77	4.20	1.17	.13	.36	.37	.82	
5	Other	.52	5.51	.89	.40	.46	.33	.29	.71

a) ICR: Internal consistency reliability (Cronbach's Alpha)
b) Diagonal elements of the 1-5 columns are the square roots of the shared variance between the constructs and their measures
c) Off-diagonal elements of the 1-5 columns are correlations between constructs

New items introduced in section 4 and a confirmatory factor analysis resulted in five ultimate constructs: the previously existed Social Conformance, Secondary Sources Influence, and Social Status, as well as additional Social Facilitating Conditions and Social Externalities. All items have high and significant loadings on their respective constructs (Table 15).

Table 15: Item Loadings (Model B, Dataset 2)

LV	Item	Data 2
BI	BI1	.8267 ***
	BI2	.9533 ***
	BI3	.9479 ***
SC	SI1	.7628 ***
	SI2	.9060 ***
	FAFI1	.8729 ***
	FAFI2	.8505 ***
	FAFI3	.7959 ***
	FAFI4	.8657 ***
	WPRI1	.8563 ***
	WPRI2	.8744 ***
SSI	SSI1	.9075 ***
	SSI2	.8387 ***
	SSI3	.8834 ***
SS	SG1	.8939 ***
	SG2	.7557 ***
	SG3	.8174 ***
SFC	FC4	.9236 ***
	FC5	.8824 ***
	FC6	.9261 ***
SE	PNE1	.8493 ***
	PNE2	.6058 ***
	PNE3	.8163 ***
	PNE4	.7060 ***

One of the major critics of the old model A was low internal consistency reliability of the construct “Other”. The new model B resolves this issue showing high to excellent ICR for all constructs. Our analysis gives no hint why the construct validity could be questioned (Table 16).

Table 16: Measurement Model (Model B, Dataset 2)

		ICR	Mean	S-Dev	1	2	3	4	5	6
1	Behavioral Intention	.90	6.31	1.17	.91					
2	Social Conformance	.94	4.93	1.28	.25	.85				
3	Secondary Sources Influence	.85	4.62	1.29	.25	.42	.88			
4	Social Status	.77	4.20	1.17	.13	.36	.37	.82		
5	Social Facilitating Conditions	.90	5.41	1.41	.21	.18	.21	.15	.91	
6	Social Externalities	.74	5.99	.77	.44	.40	.25	.20	.31	.75

a) ICR: Internal consistency reliability (Cronbach's Alpha)
b) Diagonal elements of the 1-6 columns are the square roots of the shared variance between the constructs and their measures
c) Off-diagonal elements of the 1-6 columns are correlations between constructs

The first model is relatively stable for the both sets of data collected (first and second column of Table 17, information from Table 8 is incorporated into the first column of Table 17). In both cases secondary sources and "Other" factors influence the intention to use the internet. In the second model (third column of Table 17), the coefficient of determination is on a comparable and significant level. Moreover, the conflict of the "Other" items is resolved and a high impact of social externalities is observable.

Table 17: Path coefficients and R^2 (comparison)

	M: A, D: 1	M: A, D: 2	M: B, D: 2
R^2	.1938	.1730	.2204
R^2adj	.1873	.1681	.2146
Social Conformance	.0680	.0518	.0388
Secondary Sources Influence	.1349 *	.1216 **	.1271 ***
Social Status	-.0100	-.0324	-.0173
Other	.3419 **	.3401 ***	n.a.
Social Facilitating Conditions	n.a.	n.a.	.0544
Social Externalities	n.a.	n.a.	.3835 ***

Regarding the coefficient of determination, we have to rely on the adjusted R^2 as the number of independent latent variables differs between the two models. It is apparent that model B has clearly greater explanatory power (Table 17).

7. Conclusion and Discussion

The results of our study show that the second research model works considerably better than the first one. Not only the ambiguous construct “Other” is resolved there, but also the R^2 is considerably higher. Hence, from this study we can draw several implications for both theory and practice.

Implications for theory. In our study we discussed extensively the impact of social factors on the intention to use a technology (here: the internet). One of our main contributions is the introduction of social externalities as the most influencing social factor. Apparently, such technologies as the internet are adopted once network effects occur. Social factors play a substantial role in explaining BI, so we suggest that future research on technology acceptance should keep them in mind. It is especially true for the impact of secondary sources and social externalities. Other defined social factors (Social Status, Social Conformance, and Social Facilitating Conditions), although not being of highest relevance in this study, are flawless and should not be ignored, as they might appear to be more important for adoption of other technologies (ad RQ2). Our study identified the valid social constructs in the well-established, as well as in relatively new theories. The items introduced in this paper for such constructs as social externalities and social facilitating conditions can be used in future research (ad RQ1).

Although the R^2 appears to be low, it has to be noted that this study focuses on social factors only. Comparable studies, where traditional factors were neglected as well, led to coefficients of determination of the same order (Arendsen & Wijngaert, 2011). A more comprehensive picture on technology acceptance (and, therefore, a

higher coefficient of determination) can be achieved by adding to our final model other factors, such as perceived ease of use or perceived usefulness.

Implications for practice. Today social media and networks increase the value of social factors towards technology acceptance making these factors very important for practitioners designing new technologies. Our study suggests that advertising in classical media influences technology adoption. In the specific case of promoting internet adoption local governments or computer literacy societies should not concentrate only on transfer of skills or provision of internet access, but also on coverage in media and, especially, on inclusion of peers.

Limitations. First of all, the generalization of our results to other settings is difficult. We conducted our study in two Western European cities. Hence, we only assume generalizability to developed countries. Moreover, our research was carried out in rural area, so in the future it could be continued in suburban or urban areas, as well as in less developed economies. Nevertheless, we believe that the attained results are to a great extent valid under diverse national, social and cultural circumstances.

Future research. Future research in this area could focus on our limitations and test the developed constructs in different settings. Moreover, we assume that the impact of the constructs would differ depending on the type of technology studied. Our research resulted in a comprehensive model, which in the future can be combined with other models demonstrating unified views on other aspects of technology adoption. Different core constructs of contemporary research can be examined in similar ways, e.g. “usefulness” is analyzed in MATH on a much more detailed level

than in UTAUT. Therefore, in the field of technology acceptance there is still a room for theory integration and development.

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