

Tech Students' Attitudes to Different Functionality On a Learning and Knowledge Management Platform

Markus Forsberg



**KTH Industrial Engineering
and Management**

Master of Science Thesis
Stockholm, Sweden 2017:05

Teknikstudenters attityder till olika funktionalitet på en digital kunskapsplattform

Markus Forsberg



**KTH Industriell teknik
och management**

Examensarbete
Stockholm, Sverige 2017:05

Teknikstudenters attityder till olika funktionalitet på en digital kunskapsplattform

av

Markus Forsberg



Examensarbete INDEK 2017:05
KTH Industriell teknik och management
Industriell ekonomi och organisation
SE-100 44 STOCKHOLM

Tech Students' Attitudes to Different Functionality On a Learning and Knowledge Management Platform

Markus Forsberg



Master of Science Thesis INDEK 2017:05
KTH Industrial Engineering and Management
Industrial Management
SE-100 44 STOCKHOLM



KTH Industriell teknik
och management

Examensarbete INDEK 2017:05

Teknikstudenters attityder till olika funktionalitet på
en digital kunskapsplattform

Markus Forsberg

Godkänt 2016-11-11	Examinator Terrence Brown	Handledare Henrik Blomgren
2017:05	Uppdragsgivare Anna Abelin	Kontaktperson

Sammanfattning

Denna examensrapport undersöker studenters förhållande till den uppfattade användbarheten och uppfattade användarvänligheten kring olika funktionalitet på en digital plattform för att organisera och strukturera upp kunskap. Studien undersöker relationen mellan uppfattad användbarhet, uppfattad användarvänlighet och intentionen att fortsätta använda applikationen medan ny specifik funktionalitet och kontrollaspekter läggs till som motivatorer. Studien byggs på Technology Acceptance Model (TAM) och studenterna intervjuades under ca 30 minuter angående deras attityder till olika funktionalitet och dess användbarhet. Mätmodellen anpassades och analyserades med Structural Equation Modelling (SEM) med en PLS-SEM applikation. Resultaten var i linje med tidigare forskning som menar att den uppfattade användbarheten och den uppfattade användarvänligheten är väldigt viktiga faktorer för användarnas intention att fortsätta använda applikationen. Därtill har den mer avancerade funktionaliteten en signifikant effekt på motivationen medan kontrollaspekterna har mindre signifikant påverkan.

Nyckelord

Technology Acceptance Model, TAM, Structural Equation Modelling, SEM, PLS-SEM, Uppfattad användbarhet, PU, Uppfattad användbarhet, EoU, motivation, användarkontroll.



**KTH Industrial Engineering
and Management**

Master of Science Thesis INDEK 2017:05

Tech Students' attitudes to different functionality on
a learning and knowledge management platform

Markus Forsberg

Approved 2016-11-11	Examiner Terrence Brown	Supervisor Henrik Blomgren
2017:05	Commissioner Anna Abelin	Contact person

Abstract

This master thesis study explores technical students' relation to perceived usefulness and ease of use of different functionality on a digital software platform for organising and structuring knowledge. The study investigates the relationship between perceived usefulness, ease of use and intention to continuously use the application while adding specific functionality and control aspects as motivational factors. The study is based on the Technology Acceptance Model (TAM) and the students were asked questions during a roughly 30 minutes long interview regarding their attitude towards different functionality and its usefulness. The measurement model was assessed and analysed using Structural Equation Modelling (SEM) with a PLS-SEM application. The results were in line with expectations; the perceived usefulness and ease of use were very important for the users' intention to continue to use the application. In addition, the more advanced functionality has a significant effect on the motivation while user control is less significant.

Key-words

Technology Acceptance Model, TAM, Structural Equation Modelling, SEM, PLS-SEM, Perceived Usefulness, PU, Ease of Use, EoU, motivation, control.

Table of Contents

Table of Contents	i
Table of Figures	ii
Table of Tables	ii
1 Introduction	1
1.1 Background	1
1.2 Thesis Purpose	2
1.3 Regarding the Hypotheses	3
1.4 Limitations and Delimitations	4
1.5 Outline	4
2 Theoretical Framework	6
2.1 Technology Acceptance Model (TAM)	6
2.1.1 Extended TAM	6
2.2 TAM Criticism	8
2.3 Structured Model Development and Hypotheses	8
2.4 Structural Equation Modelling (SEM)	11
2.4.1 Factor Analysis	11
2.4.2 The Likert Scale.....	12
3 Methodology	13
3.1 Research Approach	13
3.2 Method	13
3.2.1 Choosing Research Method.....	13
3.2.2 Deductive and Inductive research approach	14
3.3 Sample Selection	15
3.4 Demographic Data	15
3.5 Questionnaire and Survey Process	16
3.5.1 Interviews.....	18
3.6 About the Analysis	19
3.6.1 About Reliability and Validity	19
3.6.2 Error sources.....	23
4 Results	25
4.1 Measurement model and CFA	25
4.2 Structure model and SEM analysis	26
4.2.1 Indirect effects, mediation and total effects	28
4.3 Summary of results	31
5 Discussion and Future Research	33
6 Conclusion	36
7 Reflections	37
8 Acknowledgements	38
9 References	39
Appendix I – The Main Survey Items	i

Table of Figures

FIGURE 1: EXTENDED TAM MODEL.....	7
FIGURE 2: TAM USE CASES.....	7
FIGURE 3: STRUCTURAL MODEL.....	10
FIGURE 4: THE CYCLE OF RESEARCH THEORY.....	14
FIGURE 5: PERSONAL IDENTIFICATION.....	15
FIGURE 6: AGE REPRESENTATION OF SURVEY SUBJECTS.....	16
FIGURE 7: OVERVIEW OF THE REFINEMENT OF THE PROCESS OF THE SURVEY.....	16
FIGURE 8: THE COMPLETE MODEL.....	17
FIGURE 9: THE SOBEL TEST CALCULATOR RESULTS FROM PU.....	30
FIGURE 10: THE INDIRECT EFFECT CALCULATOR RESULTS FROM CONTROL (LEFT) AND ADVANCED FUNCTIONALITY (RIGHT) VIA MOTIVATION TO CTU.....	30
FIGURE 11: MODEL WITH PATH COEFFICIENTS AND R ²	31

Table of Tables

TABLE 1: THE LIKERT SCALE USED IN THE SURVEY.....	18
TABLE 2: EFFECT SIZE; COHEN'S STANDARD AND TRANSLATION TO PERCENTILE STANDING AND NONOVERLAP.....	23
TABLE 3: THE LOADINGS OF THE ITEMS REFLECTING THE MODEL.....	25
TABLE 4: THE COMPOSITE RELIABILITY AND CONVERGENT VALIDITY (BY AVERAGE VARIANCE EXTRACTED) FOR THE STUDY.....	26
TABLE 5: DISCRIMINANT VALIDITY ACCORDING TO THE FORNELL-LARCKER CRITERION.....	26
TABLE 6: PATH COEFFICIENTS TO THE VARIABLES IN THE MODEL AND CORRESPONDING CONFIDENCE LEVELS.....	27
TABLE 7: EVALUATED COLLINEARITY BETWEEN VARIABLES.....	27
TABLE 8: COEFFICIENT OF DETERMINATION AND CORRESPONDING CONFIDENCE LEVELS....	28
TABLE 9: EFFECT SIZE AND CORRESPONDING CONFIDENCE LEVELS.....	28
TABLE 10: INDIRECT EFFECTS.....	29
TABLE 11: PU MEDIATION INPUT DATA SOBEL TEST CALCULATOR.....	29
TABLE 12: TOTAL EFFECTS, A SUMMARY OF DIRECT EFFECTS AND INDIRECT EFFECTS.....	31
TABLE 13: ALL ITEMS IN THE QUESTIONNAIRE, WHERE THE ONES USED FOR THIS STUDY MARKED WITH THE CORRESPONDING LABEL.....	III

1 Introduction

In this chapter the background to the thesis project is explained and the thesis purpose. The hypotheses together with limitations and delimitations of the study follows together with a short outline of the report.

1.1 Background

In today's society information is overflowing; the doubling speed of information is continuously decreasing. A specialized doctor will today find it challenging to stay up to date with all new reports published within his or her field of specialization. Regardless of the subject it is getting more and more difficult to gather, understand and organize all the information and news published. In addition, as an undergrad to be able to follow the debate regarding research process and what is considered truths or theories is also a major task. The traditional way of accessing the information is by reading books and articles. Today there are multiple ways to gain access to the information; many books and journals are available online which grants additional computing power to utilize regarding finding, indexing and summarizing texts. By reading, annotating, highlighting, analysing, questioning and discussing the information the reader hopefully gets informed and gets enlightened. The information is turned into knowledge and stored in the reader's mind. However, the article itself often ends up archived, in a folder on a hard drive or in a pile of other articles on a desk. After some time, the knowledge has, in the reader's mind, turned into a truth; the knowledge has been tested and reshaped and transformed while the reader has further developed and built the knowledge. Looking back on the archive, a problem remains. The reader has made notes, written papers and put in further references to better follow the line of thought. However, all the unwritten mental connections that the reader has made; between articles and between theories, cross-references to other fields and other's recommendations etcetera, is challenging for the reader to understand and remember how this knowledge came to be. The reader needs to remember all the connections drawn and recreate the information in the original context to refresh the knowledge. The understanding of how the knowledge came to be is often unwritten and only archived in the delicate mind of the reader. An addition and adjacent challenge sprout from the fact that today it is not uncommon that multiple researchers work together in a team to solve a problem or develop a theory. The earlier presented problem with remembering learning paths is therefore also applicable to teams with members that have a need to share knowledge and develop understanding together while at the same time staying true to the research goal and purpose. A second additional layer is that higher education in recent years is going through a major shift regarding how to communicate information. The Internet has enabled nearly anyone to access information and education material from some of the finest universities around the world. The basis of distance education has been discussed continuously ever since the telephone and the social media networking sites have accelerated the frequency of interactions across digital space.

There are multiple tools on the marketplace that acknowledge the main problem encircled above; i.e. structuring knowledge in digital space is hard, especially when working in a social context in a team, while also keeping track of news and breakthroughs plus watching out for the pitfalls and wrong turns. All the products on

the market enable you to sort and structure the information that you collect, but all of them focus on structuring the information; not the knowledge that you build and develop. According to the definitions of the terms, “*Information*” is defined as “Facts provided or learned about something or someone: ‘a vital piece of information’ ” (Oxforddictionaries.com, 2016), while “*Knowledge*“ is defined as “Facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject.” (Oxforddictionaries.com, 2016) In the field of philosophy “*Knowledge*” categorises as something “true, justified belief; certain understanding, as opposed to opinion.” (Oxforddictionaries.com, 2016) Comparing the two definitions one can denote that the word “understanding” is only included when describing knowledge and is not required for something be called information. Information is therefore, by definition, a broader term than knowledge. Throughout this master thesis the term knowledge is referred to as information that have been gained and processed to a truth; i.e. a certain specific understanding of some information on an individual level.

By using the tools and technology that are available today, organizing information and transforming information into knowledge could be done in a more efficient way than before. Though these tools leave a lot to wish for. Also a lot of questions remain in order to be able to build a digital tool that will revolutionize the way people seek, gather, understand and turn information into knowledge. One of the tasks that remain is to understand which forces are driving users to utilise new and radically different digital tools for building and organising knowledge, thoughts, ideas and texts in a digital environment. This task is the focus of this thesis.

This thesis includes an investigation of the user’s intention to continue to use a digital platform from a technical point of view and with a technical perspective. A background review of the literature reveals a fitting framework, model development gives a measurement model, test and polish discloses the results; which are presented. To test the model a sample was taken from one of the primary target groups for the digital platform.

1.2 Thesis Purpose

The purpose of this master thesis and the study is explained and motivated below together with the research questions that will serve as the main focus for the study.

The reason behind the investigation is to gain an understanding, from a technical perspective, regarding how to prioritise when developing a digital platform for a targeted user base group. The main targeted user base group in this study is university students and therefore the study will focus on this group. For instance, the sample for the study was taken from the Royal Institute of Technology (KTH). “The users” are therefore used somewhat synonymy with “the students” throughout this report.

With the main research question in mind;

- Which forces are driving users to utilise new and radically different digital tools for building and organising knowledge, thoughts, ideas and texts in a digital environment?

From the main research question the main purpose of the investigation is formulated as to understand which aspects affects the expected user's intention to continue to use a specific digital platform. Additional aspects to what drives users' motivation to continuously use a digital platform for building, sharing and structuring their knowledge on a platform. Therefor the research questions are summarized into:

- Which are, from a technical standpoint, the main aspects to consider when developing a digital platform for building knowledge for university students?
- What drives the users to accept a digital platform for managing knowledge?
- How is new functionality on its own, motivating to the users' motivation to continue to use a digital tool for managing knowledge?
- How are control aspects, such as privacy filters, affecting the user's motivation to continue to use a digital tool for managing knowledge?

The background literature review conducted to build a framework for the investigation examined a variety of areas such as customer loyalty, feasibility of digital tools, usability studies, users' intentions on digital platforms etc. These areas were investigated from perspectives of psychologists, graphic designers, marketers, vendors, investors and more. The thesis investigation is an exploration study with a literature review examining articles in areas such as software development, motivation and incentives driving changed behaviour online, psychology, marketing and communication. Example of topics investigated are e.g. incentives used to motivate users on online platforms, factors to consider when investigating a digital knowledge platform and which models can be used to test for the acceptance of a digital learning tool.

The results from the study can be used for multiple purposes; to the original intent i.e. use it to prioritise development of a digital tool for building and sharing knowledge. It can e.g. help to better the understanding of motivation on a digital platform or prioritise development of functionality on a digital tool using alternative techniques such as gamification and other.

To summarize, the purpose of this thesis is to create an understanding regarding what drive users to engage on a digital knowledge platform. The aspiration is to describe the parameters included in the study, as how strongly they connect (i.e. as incentives that can be measured) to the desired user engagement. By doing so describe important factors impacting the users' ability to accept and utilize (i.e. continue to use) the platform and to monitor the successful adoption of the digital platform.

1.3 Regarding the Hypotheses

In order to fulfil the research purpose and answer the research questions, a number of central components need to be addressed. In this chapter the hypotheses will be listed and shortly explained. The components behind the hypotheses are further elaborated on in chapter 2 Theoretical Framework.

The key factors that are considered in the tested model of this master thesis regarding acceptance of the digital platform in the terms of functionality are Perceived Usefulness (PU), Ease of Use (EoU), and Intention to Continuously Use (CTU). In addition, Motivation and the user's attitude towards specific Innovative Functionality

and Control when sharing knowledge is also included in the model. The hypotheses investigated in the study are:

H0: There are no significant effects on users' intention to CTU a knowledge management platform based on PU, EoU or the user's Motivation to do so.

H1: PU impacts the user's intention to CTU the knowledge management platform.

H1a: PU impacts the user's Motivation to use the knowledge management platform.

H2: EoU impacts the user's intention to CTU the knowledge management platform.

H2a: EoU impacts the PU of the knowledge management platform.

H2b: EoU impacts the user's Motivation to use the knowledge management platform.

H3: Motivation impacts the user's intention to CTU the knowledge management platform.

H3a: Motivation mediates the positive effects of Control on CTU.

H3b: Motivation mediates the positive effects of Innovative Functionality on CTU.

The hypotheses ending with a) and b) are checking for mediating affects that are expected to surface in the study. More literature support for the constructs and further information about the development of the structural model is found in chapter 2.3 Structured Model Development and Hypotheses.

1.4 Limitations and Delimitations

The timeframe of the thesis project is limited to 20 weeks starting in end of February 2016 with limited resources. The survey was conducted during three weeks in May.

The project is limited to examining a specific knowledge management platform for building and sharing knowledge. However, the results can, with caution, be applied to any digital platform in the knowledge management field.

The sample is taken from the Royal Institute of Technology (KTH) main campus in Stockholm, Sweden and is mainly, but not limited to, Swedish students. Due to time constrains the questionnaire will not be distributed to multiple universities. The language of the survey is in English to enable international students studying at KTH to partake in the survey. The implications of using a secondary language are discussed in chapter 5 Discussion and Future Research. In addition, cultural and lifestyle differences regarding the perceptions of functionality and behavioural traits that are not considered in the data analysis are expected to exist between the Swedish students and the international students. In chapter 3.6.2 Error sources these types of phenomenon are elaborated on.

The software chosen for the analysis is SmartPLS because of the research objective and analysis. The application utilizes a Partial Least Square (PLS) Structure Equation Model (SEM) technique. The application, in the context of this thesis, is supported and further explained in chapter 2.4 Structural Equation Modelling.

1.5 Outline

The thesis report begins with an introduction chapter where the purpose of the thesis is explained together with the purpose of the study as well as the academic contribution and hypotheses. The second chapter, the theoretical framework, goes into

details on different fields relevant for the study. The third chapter elaborates on the research process and the methodology, the research approach and the different aspects of the method used in this study. In the fourth chapter the results of the study are presented. The fifth chapter includes a discussion with more personal standpoints together with some short paragraphs on proposed future studies and areas to investigate further. Chapter six contains a conclusion of the thesis project. Lastly a few acknowledgements from the author and references. There is also an appendix with material from the research study.

2 Theoretical Framework

In order to fulfil the research purpose, a number of central components need to be addressed. In this chapter the key aspects to consider for users to accept a digital platform for knowledge building and sharing will be explained and the hypotheses will be further explained along with the main areas reviewed in preparation for the study. In addition, the structural model and the literature support for the model will also be addressed.

The model was initially based on the Technology Acceptance Model (TAM) and from there modified in accordance with available previous research which aligned with the research questions. From there the measurement model was formed. In this chapter the adoptions of TAM and modifications to the model will be further explained together with the basics of the Structural Equation Modelling (SEM) technique utilized to assess and analyse the data and evaluate the model.

2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) (Davis, 1989) (Davis, 1993) (Davis, Bagozzi, & Warshaw, 1989) was introduced in 1986 (Davis, 1986) and has since been utilized to understand human behaviour in a wide variety of fields and research areas. During the years it has been used to test for and predict the acceptance and use of information technology (Benbasat & Barki, 2007) (Lee, Kozar, & Larsen, 2003). It is based on the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) (Ajzen & Fishbein, 1980). The original TAM assumes that an information systems acceptance from the users is determined by two major variables: Perceived Usefulness and Perceived Ease of Use (Davis, 1986). Perceived Ease of Use was defined by Davis (1989) as “the degree to which a person believes that using a particular system would be free of effort” and Perceived Usefulness was defined as “the degree to which a person believes that using a particular system would enhance his or her job performance”. (Davis, 1989)

TAM has been utilized in research of widely different technologies (e.g. word processors, e-mail, WWW, GSS, Hospital Information Systems) in different situations (e.g. time and culture), with a variety of control parameters (e.g. gender, organisational size, etc.) as well as with different samples (students, undergraduates, MBAs, etc.) which has led to big success (Lee, Kozar, & Larsen, 2003). During the model introduction TAM was verified and maintained its consistency and validity in explaining users' acceptance behaviour. Researchers differentiated it from TRA and in comparisons between the two TAM better explained the acceptance intention of the users than TRA. Summed up, the “studies in this period extensively investigated whether TAM instruments were powerful, consistent, reliable, and valid and they found these properties to hold.” (Lee, Kozar, & Larsen, 2003). During the 1990's the research community made remarkable advances to develop the understanding that regarding illumination of the causal relationships theories and their predecessor factors.

2.1.1 Extended TAM

Extended TAM was developed when researchers proposed adding external factors to the model in order to explore the effects of external factors on the user's attitude,

intentions and actual use of the system. External factors could be trialability, compatibility or perceived behavioural control etc. (Fathema, Ross, & Witte, 2014) (Fathema, Shannon, & Ross, 2015). The most important constructs in Extended TAM are (as in the original model) the Perceived Usefulness and Perceived Ease of Use. These two factors directly affect the user's intention to use and accept an application and are both affected by external variables e.g. demographics, system characteristics, personality traits. (Chen, Lin, Yeh, & Lou, 2013) (Fathema, Ross, & Witte, 2014) (Fathema, Shannon, & Ross, 2015) A general illustration of the Extended TAM model can be seen in Figure 1.

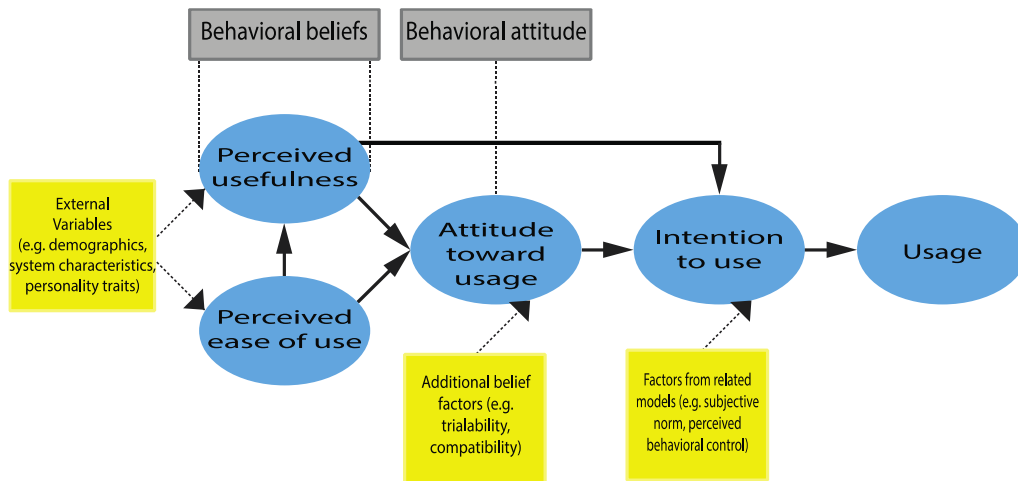


Figure 1: Extended TAM model

The extensions to the original TAM are illustrated in Figure 1 by the grey and yellow boxes. The yellow boxes contain the effects of external variables on internal beliefs, attitudes, and behavioural intentions.

Due to the well-established framework TAM has been used in a vast spectrum of fields which is illustrated in Figure 2. The credibility that TAM has earned during the years it has been used extensively in a great variety of fields and systems.

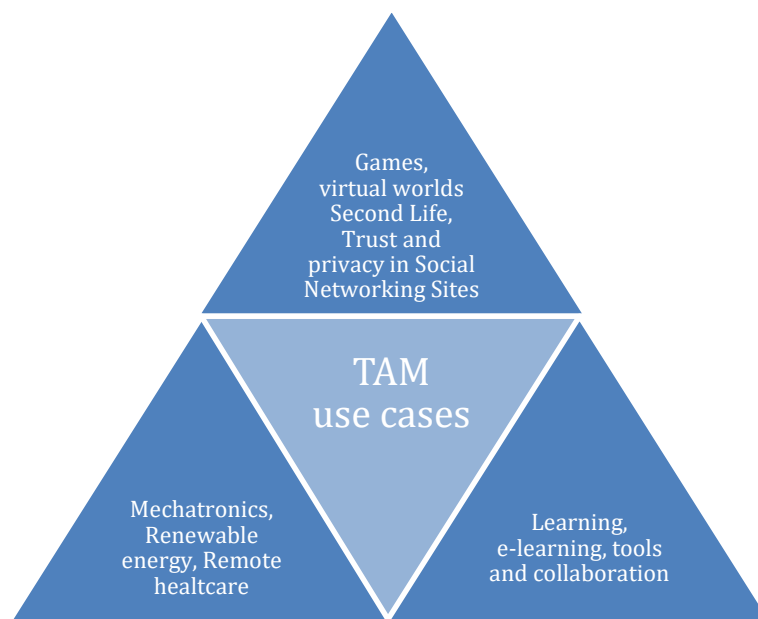


Figure 2: TAM Use cases

Examples of relevant areas are: Learning and the use of Web Course Tools (Ngai, Poon, & Chan, 2007) and (Sanches-Franco, 2010). Educational Wikis (Liu X. , 2010). Google Applications for collaborative learning (Cheung & Vogel, 2013).

The use of virtual world Second Life for learning (Hayat, Ahmed, Tariq, & Safdar, 2013), (Bhatiasevi, 2011), (Chowa, Heroldb, Chooc, & Chana, 2012) and (Shen & Eder, 2009). User's Trust and privacy on social networking sites (Huang, Wu, & Lu, 2016). Customer loyalty (Ozturk, Bilgihan, Nusair, & Okumus, 2016).

TAM has also been utilized in areas such as: Mechatronics in production (Bröhl, Nelles, Brandl, Mertens, & Schlick, 2016). Renewable energy (Kardooni, Yusoff, & Kari, 2016). Remote healthcare (Barsaum, Berg, Hagman, & Scandurra, 2016).

Along with many other fields. In a lot of these areas modified versions of TAM has been developed and utilized, were the researchers have explored different settings and different belief factors.

2.2 TAM Criticism

During the years there have been raised voices in the research community regarding models using TAM as a framework and the ability to reliably relate to predicting innovative IT products usage. (Wells, Campbell, Valacich, & Featherman, 2010) Researchers (Benbasat & Barki, 2007) have proposed that researchers should consider beliefs other than ease of use and usefulness.

An alternative to TAM could have been to use Technical Readiness (TR). TR has been applied in multiple areas across different fields; retail, to compare consumers in different countries, to understand the TR of service employees and to explain the relationships between perceived ease of use, usefulness and behavioural intentions, however it has not been utilized as much in IS research. (Parasuraman, 2000) Therefore, TAM suited the purpose of this study better than TR.

2.3 Structured Model Development and Hypotheses

Due to that the structured model was originally from the third extension of TAM (see Figure 1) and from there developed further, the literature review for construct development was based on earlier research utilizing TAM. The literature review focused on previous research on measuring attitudes on software platforms. Fields investigated were 1) online learning and motivation in the context of online education and Knowledge sharing, 2) electronic commerce (E-Com) and perceived risk, 3) Social capital in e.g. Social networks and online business with factors such as satisfaction, trust, and participation, 4) Leadership, marketing, communication in online communities, gaming and online trust. In this chapter all the constructs introduced in earlier chapters will be explained and elaborated on in a relevant context.

Below are the hypotheses from chapter 1.3 with more extensive literature support for the factors and hypothesises in the model.

In this study the constructs Perceived Usefulness and Perceived Ease of Use were adopted from “*User Acceptance of Computer Technology*” (Davis, Bagozzi, & Warshaw, 1989). The two constructs are affecting Intention to Use while also impacting a behavioural attitude construct. Hence the hypotheses:

H1: PU impacts the user’s intention to CTU the knowledge management platform.

H2: EoU impacts the user’s intention to CTU the knowledge management platform.

H2a: EoU impacts the PU of the knowledge management platform.

And the null hypothesis:

H0: There are no significant effects on users’ intention to CTU a knowledge management platform based on PU, EoU or the user’s Motivation to do so.

In this model the attitude towards use of the knowledge management platform is measured by the construct Motivation. Motivation and incentives for users on digital platforms has been discussed in a lot of previous research. For instance in E-Learning and Online Education (HersHKovitz & Nachmias, 2011) (Artino & Jones, 2012) (Chen & Jang, 2010). A reason for this could be that Motivation is one of the most important psychological concepts in education (Rodgers & Withrow-Thorton, 2005) (Vallerand, et al., 1992). In addition, intention and motivation to share are key drivers in regards to knowledge sharing in organisations (Siemsen, Roth, & Balasubramanian, 2008).

Therefore, the hypothesis:

H3: Motivation impacts the user’s intention to CTU the knowledge management platform.

To incorporate PU and EoU the additional hypotheses are:

H1a: PU impacts the user’s Motivation to use the knowledge management platform.

H2b: EoU impacts the user’s Motivation to use the knowledge management platform.

Facilitating conditions has been discussed by researchers in the context of TAM before. This topic was introduced in chapter 2.1.1 Extended TAM. User control is a facilitating condition that has been discussed in a lot of areas previously and is often discussed together with distributed and power sharing and/or trust. For example, Jameson (2009) state:

“Assuring effective leadership in online communities is an important prerequisite for safe, harmonious participation by members. Such leadership seems best achieved through distributed power sharing that encourages trust and copes with apparently contradictory requirements for visibility and invisibility” (Jameson, 2009)

Distributed power sharing would, in an online community, entitle users to control the online environment, especially their own input. Previous research that have investigated online environments and trust/control, in fields such as e-com (Cho, 2010), online communities (Valenzuela, Park, & Kee, 2009), online games (Voiskounsky, Mitina, & Avetisova, 2009) and online marketing (Chaari, 2014). In addition, previous communication and marketing research also show that online users need to be considered as active constructors, i.e. in control, of their own experience (Chaari, 2014).

The definition of when an individual intends to deliver, obtain and communicate information that is well understood by the individual is called Knowledge sharing (Chen, Chang, Tseng, Chen, & Chang, 2013) (Hung & Cheng, 2013) (Okumus, 2013). Ma and Chan (2014, p. 52) define knowledge sharing as “the communication of knowledge from a source in such a way that it is learned and applied by the

recipient”. Knowledge sharing is further defined as “the combination of one or both parties seeking knowledge in response to the request, such that one or both parties are affected by the experience.” (Scott & Ghosh, 2007) On an online platform where the concept of sharing knowledge is essential to the primary idea of the platform, the user’s attitude towards the concept of knowledge sharing and the functional sharing option possibilities and limitations are essential.

By adopting the idea that online users are considered as active influents in the communication of their own personal brand and with the intension of structure and share their knowledge, user control need to be considered. By putting the user in control of sharing opinions regarding thoughts and ideas to other users, creates a paradigm were the users need to be in the centre on the online digital platform focus. Therefore, the thesis:

H3a: Motivation mediates the positive effects of Control on CTU.

Innovative functionality, that has not been seen before and untested on the market is a motivation factor for early adopters, especially among young people. An example of this is shown in the fintech industry were innovative offerings is one of the primary reasons for the customers to use fintech services. The authors conclude that

“Some of the new FinTech services are simply better, offering deeper or unique value propositions, and a more intuitive experience than traditional financial products. Ease of setting up an account is a great example: with many FinTech products, account setup can be completed in a few minutes.” (Gulamhuseinwala, Bull, & Lewis, 2015)

In their study “innovation” is a reason for continued use listed after factors such as Ease of Use (e.g. setting up an account), diverse offerings and competitive prices (Gulamhuseinwala, Bull, & Lewis, 2015). Several studies have shown that lead user innovations, i.e. innovations attractive for early adopters, tend to be commercially attractive and viable (Thomke, 2007). Hence the hypothesis:

H3b: Motivation mediates the positive effects of Innovative Functionality on CTU.

All the hypothesis stated above are shown in Figure 3: Structural model.

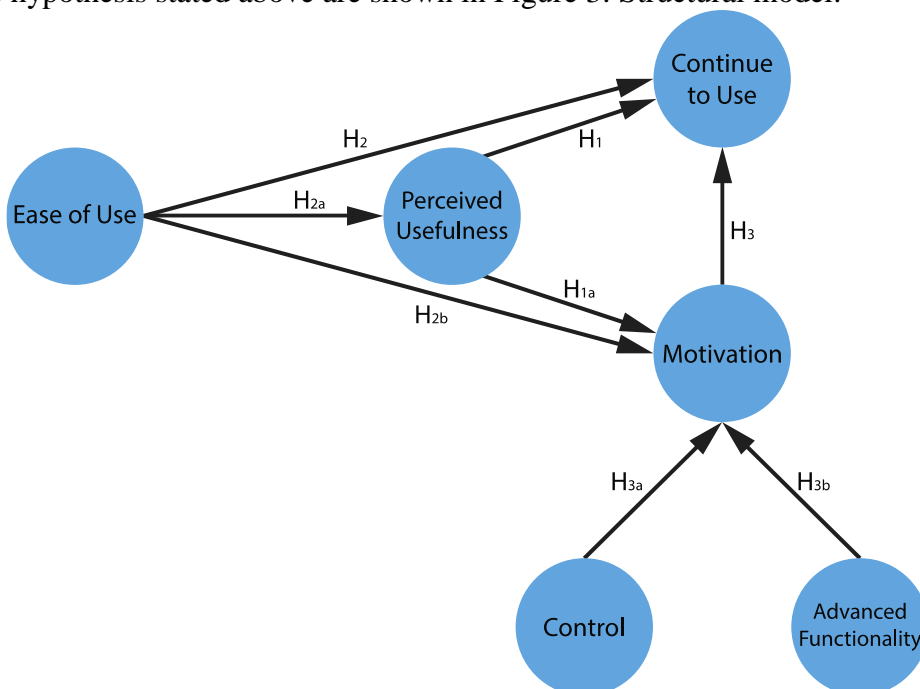


Figure 3: Structural model

2.4 Structural Equation Modelling (SEM)

In this chapter the basics of Structure Equation Modelling (SEM) will be explained together with the measurement model used for analysis.

To begin with, there are multiple techniques in SEM, different tools and applications to use for each case depending on the research goal. Covariance based SEM (CB-SEM) and Partial Least Square SEM (PLS-SEM) are used for different research objectives. CB-SEM for confirmation and PLS-SEM for prediction. Hair, Ringle and Sarstedt (2011) state:

“The philosophical distinction between CB-SEM and PLS-SEM is straightforward. If the research objective is theory testing and confirmation, then the appropriate method is CB-SEM. In contrast, if the research objective is prediction and theory development, then the appropriate method is PLS-SEM. Conceptually and practically, PLS-SEM is similar to using multiple regression analysis. The primary objective is to maximize explained variance in the dependent constructs but additionally to evaluate the data quality on the basis of measurement model characteristics.” (Hair, Ringle, & Sarstedt, PLS-SEM: Indeed a Silver Bullet, 2011)

Whether to use CB-SEM or PLS-SEM is a decision that must be taken with consideration. Hair et al. (2014) present a rule of thumb when deciding:

“Both methods differ from statistical point of view, so neither of the techniques is generally superior to the other and neither of them is appropriate for all situations. In general, the strengths of PLS-SEM are CB-SEM’s weaknesses, and visa versa. It is important that researchers understand the different applications’ each approach was developed for and use them accordingly” (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014)

Because of the research objective; to investigate users’ attitudes regarding the perceived usefulness of functionality on a digital platform and the intention to continue using the platform, and due to additional reasons such as sample size, non-normal data, PLS-SEM was chosen as the method and the Smart PLS application was chosen for the calculations. For a review see (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).

SEM is a commonly used technique when investigating user motivation and customer loyalty phenomenon. Therefore, a lot of articles which are using this approach are available for reference. In the next chapter 2.4.1 Factor Analysis the process of construct development is explained in more detail.

Validity and reliability issues have traditionally been managed with examining validity and reliability scores on the instrument used for measurement in a particular research design. Given acceptable levels on the scores would approve the use of the scores in statistical analysis. SEM was developed to incorporate measurement error adjustments into statistical analyses. (Schumacker & Lomax, 2016) Further details on the validity and reliability technicalities are explained in chapter 3.6.1 About Reliability and Validity. In chapter 4 Results all results from the measurement model are presented and discussed further in chapter 5 Discussion.

2.4.1 Factor Analysis

Factor analysis is a statistical method with the purpose of generalise gathered data with mathematical techniques. (Child, 1990) A factor analysis evaluates, from a number of observed variables, a lesser number of underlying, unobserved variables which are called underlying constructs or underlying variables. In other words, with

Factor Analysis one can analyse, simplify or generalise complex multidimensional patterns and the underlying constructs for a huge number of observed items. There are two types of Factor Analysis Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Traditionally, EFA has been used to explore the possible underlying factor structure of different cases with observed variables without influencing the outcome with predetermined structures. (Child, 1990)

In this study, CFA is applied to determine the construct validity of the survey items. The CFA explains how well the constructs are explained by the underlying variables. (Hair, Black, Babin, Anderson, & Tatham, 2010) In other words, whenever the correlation of the items within the same construct is relatively high it is said to have the construct validity. Also, the factor loading or the regression weight and the squared multiple correlations (SMC) of the items are significantly correlated to the specified construct would also contribute to the construct validity comprehension.

The results from the CFA is presented in chapter 4.1 Measurement model and CFA on page 25.

2.4.2 The Likert Scale

A set of very popular tools for measuring ordinal data in social and psychosocial contexts was published by Rensis Likert in the 1932 in his dissertation “A Technique for the Measurement of Attitudes”. (Likert, 1932) The scale includes items that are simple and straightforward put in wording and therefore easy for respondents to indicate the extent that they agree or disagree to the statement. Usually on a five or seven-point scale with common extremes such as “strongly disagree” and “strongly agree”. Likert scales are summated scales and the overall scale score may be a summated of the attribute values of each item selected by a respondent. (Bhattacharjee, 2012)

Balasubramanian (2012) describe the Likert scale well in his paper were he wants “to raise awareness of constructing Likert technique of attitude scale”:

“Attitudes are individually attributed emotions, beliefs and behavioral tendencies an individual has towards a specific abstract or concrete object. Attitude is a personal disposition common to individuals, but varying in degrees, which impels individuals to react to object, situations or prepositions in ways that can be called favourable or unfavourable. It is the degree of positive or negative disposition associated with some psychological object. Interest is a feeling which accompanies special attention to some content or objects. Interest and attitude denotes the positive or negative feeling or disposition. Hence, the statements to measure the dimension were constructed in terms of the interest and attitude is likely to have, whether it is positive or negative. Scaling is the science of determining measuring instruments for human judgment.”
(Balasubramanian, 2012)

Four properties that a Likert scale ought to fulfil was presented by Spector (1992). The first property is that the scale should contain more than one item. The second property is that every item should measure an underlying phenomenon. The third property is that no item should have a “correct answer”. The fourth property is that the items should be statements designed so that the answers reflect the respondent’s personal opinion and not an answer; i.e. it is not an answer on a question it is merely an opinion. (Spector, 1992) These are also elaborated on by Balasubramanian (2012).

3 Methodology

In this chapter the procedure and research approach applied in this study will be presented together with the key aspects of the chosen research approach and the method.

3.1 Research Approach

The study was developed in a number of stages. In the first stage a literature review was conducted on different relevant topics. From the literature review a number of items created the main questions for the questionnaire. In the second stage the statistical model was built and tested on a small number of people to ensure that the quality of the questionnaire was of sufficient standard. In the third stage data was gathered with interviews. Thereafter the data from the questionnaire was analysed with statistical analysis.

Stage 1

To investigate which factors are affecting the motivation and intention to use the digital knowledge sharing platform previous research was reviewed. The topics that were investigated were online education, motivation on online communities, digital knowledge sharing platforms to mention a few. From the review the draft of the first items for the questionnaire were developed. An elaboration on the questionnaire can be found in chapter 3.5 Questionnaire and Survey Process on page 16.

Stage 2

Based on the literature and the area of investigation the research model was built. In order to assure the quality of the questions and to ensure that they reflected the constructs correctly a number of interviews with a smaller sample. Based on the input from these interviews some modifications were made and then the questionnaire was finalised.

Stage 3

The questionnaire was then used in interviews with students to gather data for the analysis and thereafter analysed with statistical analysis.

3.2 Method

In this chapter the research method applied in this study will be explained and the different aspects of the chosen method will be presented.

3.2.1 Choosing Research Method

The first choice when conducting a scientific study is to choose the scientific method, should a qualitative or a quantitative approach be used. When using a qualitative method, the data is gathered by interviews or questionnaires with open or semi structured questions. When using a quantitative method the data is generally gathered with interviews or surveys with first or secondary data which can be quantifiable. (Bhattacharjee, 2012)

There are benefits and drawbacks with both these methods and the suitability of each depend on the topic of investigation. A combination of the two is possible and can be

beneficial for studies that are not in a laboratory setting i.e. social sciences and education. (Bhattacharjee, 2012) In this project a quantitative method was used, with additional qualitative elements. A qualitative method was used for the pre-study relating to assuring the quality of the questionnaire and a quantitative method was used for the main study. In order to be able to measure the purpose of the study, i.e. motivation to continuously use the digital knowledge management platform, a quantitative method should be used in order to statistically analyse it and to enable the possibility to scale it further. The data used in the study was primary data collected via the questionnaire and interviews. The questionnaire was chosen due to limitations of the project i.e. the limited time of the researcher and budget constraint. In this regard a questionnaire survey is very efficient and very scalable. In addition, in order to keep the material used in the study confidential structured interviewing was applied. The qualitative data gathering in the pre-study was conducted to assure the quality of the questionnaire. In addition, a couple of open ended follow up questions was included on the questionnaire in order to supply the researcher with the interviewees' reasoning and follow of thought.

3.2.2 Deductive and Inductive research approach

There are two ways to approach a research phenomenon, a deductive research approach and an inductive research approach. The goal in inductive research is to infer theoretical concepts and patterns from observed data. In deductive research, the goal is to test concepts and patterns known from theory using new empirical data. Hence, alternative terms to inductive research and deductive research are theory-building research and theory-testing research. Deductive reasoning works from the more general to the more specific and Inductive reasoning works the other way, moving from specific observations to broader generalizations and theories. The two can be combined to form a continual cycle which is illustrated in Figure 4: The Cycle of Research Theory. A combination of the deductive and inductive approach is commonly used. (Trochim & Donnelly, 2006)

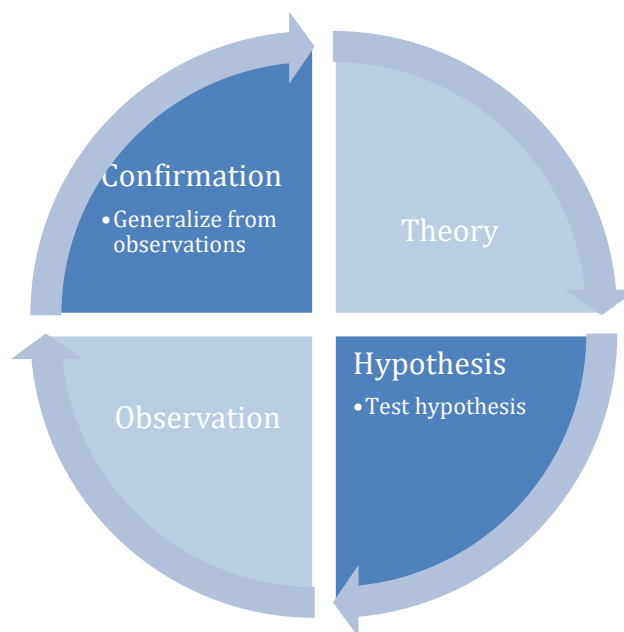


Figure 4: The Cycle of Research Theory

In this thesis a combination of deductive and inductive approaches is applied where a theory first will be developed based on previous research and semi-structured interviews to construct hypothesis which will be tested on students with a quantitative analysis. The reason for this method is to ensure face validity and reliability by continuously iterating and improving the items to minimize misunderstandings and errors.

3.3 Sample Selection

The population in this survey are students studying technology, that are using any kind of digital tool to organise or structure knowledge digitally. The population is not delimited to any geographical area or field of study. However, due to practicality aspects and the limitations of the study a representative sub-group of students studying at the Royal Institute of Technology (KTH) main campus has been taken from the population. The sample is representative because of the multiple tech fields that are available at KTH. Random students around KTH Campus were asked to partake in the survey, based on a short presentation of the application. 152 students said yes to participate in the interview survey. Due to the fact that the limitations of the study is not affecting the selection of subjects within the subgroup of KTH students, the sample is therefore considered as a random sample. The limitations and delimitations affecting the selection for the sub-group are geographical limitations and time constraints.

During the sampling, when the students were asked to participate they all conducted studies at the university, both on bachelor degree level or master degree level in different fields of study at the KTH.

3.4 Demographic Data

Below is the demographical data for the study presented. The majority of respondents were male (57%) which is illustrated by Figure 5.

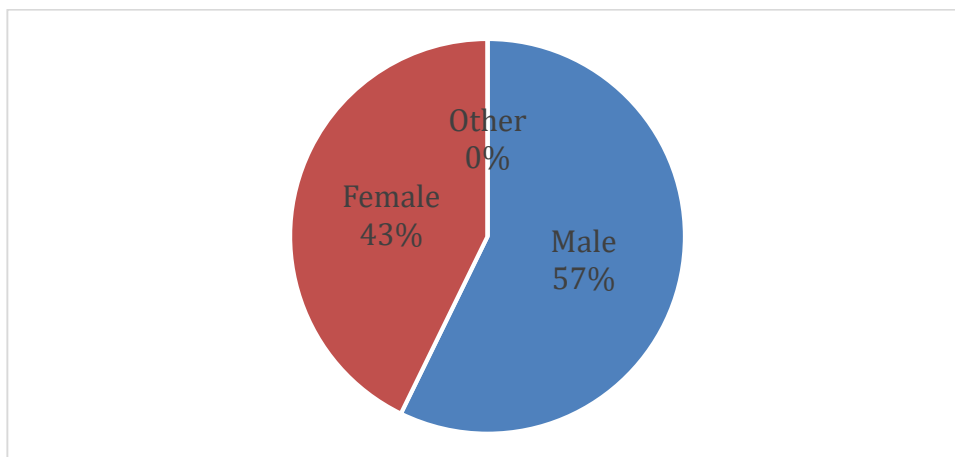


Figure 5: Personal identification

Participants' ages ranged from 19 to 42, with 76% falling in the 20 to 25-year category. This is visualised in Figure 6: Age representation of survey subjects nedan.

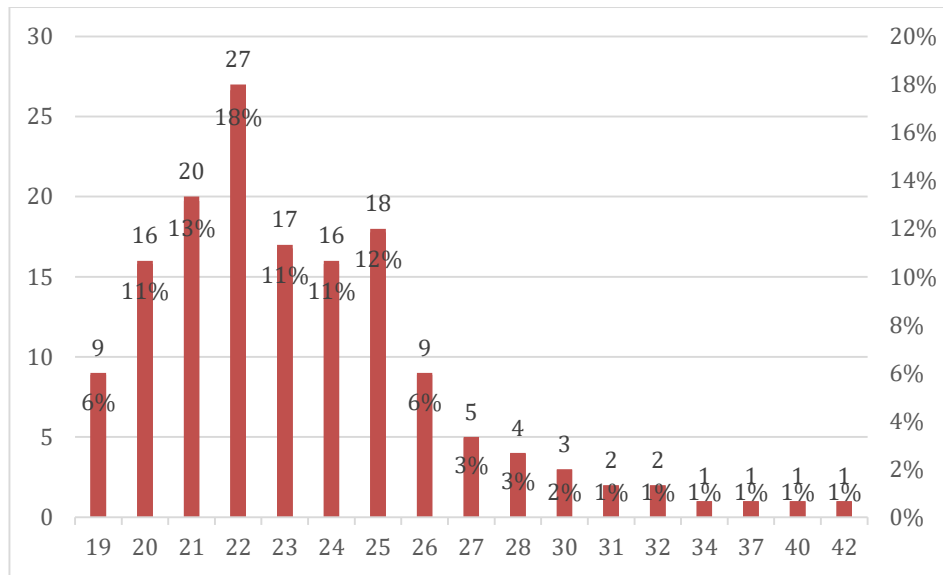


Figure 6: Age representation of survey subjects

Visible in Figure 6 is the absolute number of participants on the left hand axis and the number of participants in each age category relative to the total number of participants in the study presented on the right hand axis. Both numbers of participants in each category is also labelled above each age column on the x-axis.

3.5 Questionnaire and Survey Process

The study was based on a refinement process in order to evaluate each item in the survey. The process is illustrated in Figure 7: Overview of the refinement of the process of the survey. The outcome of each step is also included in Figure 7.

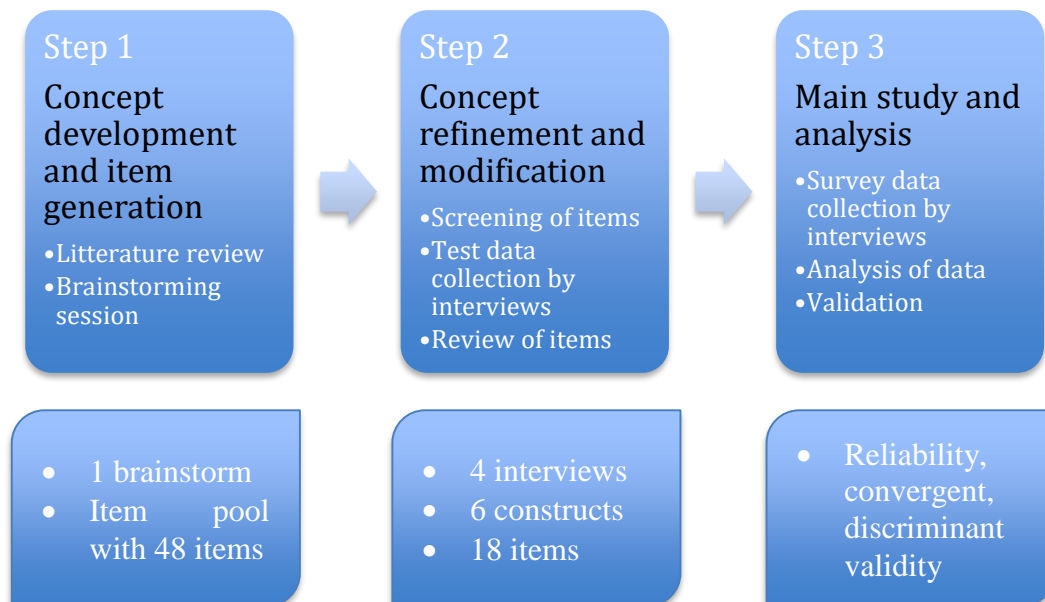


Figure 7: Overview of the refinement of the process of the survey.

Step 1 included the preparations for the survey, which involved reviewing literature and articles in different areas and fields of study. The method used to build the knowledge base and fundament for the study as well as gather articles included a snowball sampling technique i.e. articles referring to other articles.

The conceptual development and refinement of the survey was in two stages. First it was formed from a comprehensive review of beginning set of constructs together with measurement items for those factors. These were collected from articles in popular journals, practitioner-oriented and popular press publications were also examined. A number of factors and measurement items from prior studies were included without changes, whereas others were adapted from other sources and adapted to fit the study. A brainstorm contributed with addition perspective for the item pool. Due to limitations in the scope, the refinement of the parameters was short and the item pool was evaluated with a minimal sample, this will be further elaborated on in chapter 5 Discussion and Future Research. The outcome of Stage 1 was an item pool of 48 items.

In stage 2, four interviews were performed with users that well understood the different functionalities, in order to ensure that the items well reflected the constructs and to decide which items were to be excluded from the deeper analysis of the constructs. The specific goal of the interviews was to validate the beginning set of the constructs and to screen out redundant or inadequate items as well as produce new ones in order to ensure completeness (i.e., that no key factors were overlooked) and content validity of the scales.

The outcome of step 2 was a measurement model and a list of total 18 items measuring 6 constructs. In the model *Innovative Functionality* was formed with two items regarding undeveloped and untested functionality. Together with the *control* construct it was set to have a mediating effect on the will to *continue to use* through the endogenous construct called *motivation*, which was also introduced during this stage. In addition, 15 demographical questions and control parameters were included in the survey as well as 15 related items regarding use of other similar applications. However, these items were deemed to be outside of the scope of the study. The complete model is shown in Figure 8: The complete model.

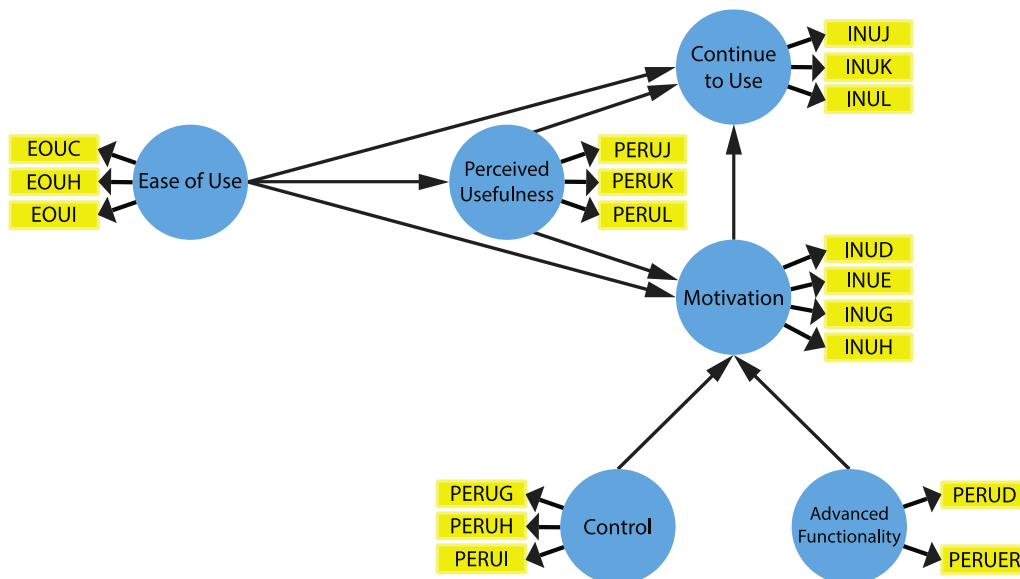


Figure 8: The complete model.

In step 3 KTH students were asked face to face around campus to participate in the study. 152 of the asked students wanted to join the study. Each student was interviewed and asked the items in the questionnaire (see Appendix I – The Main Survey Items). Each interview took roughly 30 minutes depending how much the interviewee elaborated on each item. Some of the comments will be discussed in chapter 3.6.2 Error sources.

The outcome of step 3 was interviews from a random sample of n=152 students from different fields of study at The Royal Institute of Technology (KTH) in Stockholm. Reliability, convergent and discriminant validity of the study was also established and these measurements are explained further in chapter 3.6.1 About Reliability and Validity.

3.5.1 Interviews

The participants were informed that the survey was to investigate their attitude towards the perceived usefulness of different functionality, the perceived ease of use of different functionality and how the functionality would affect their intention to continuously use the application. They were told that the interview would take approximately 30 minutes and that they should answer the questions based on picture illustrations and that they should answer according to the Likert scale (see Table 1) which was printed on a paper without the corresponding numbers.

The questions appeared on a monitor in front of the interviewees and also read by the interviewer. In order to better understand the answers from the interviewees and to tackle the language limitations, a few follow up questions were included and asked at random. In these open-ended questions the interviewees were asked to elaborate on the answer and explain how they motivated the answer. The semi-structured questions aimed to better the understand the answers and to communicate the questions better.

The technique chosen to measure the users' attitudes in the survey was a 7 step Likert Scale ranging from *Strongly Disagree* to *Strongly Agree*. The *No opinion* option work as a discrete value and will be substituted during the data analysis. All options are illustrated in Table 1: The Likert scale used in the survey.

The Likert Scale (with numbering)

- 1 Strongly disagree
- 2 Disagree
- 3 Slightly Disagree
- 4 Slightly Agree
- 5 Agree
- 6 Strongly Agree
- 0 No opinion

Table 1: The Likert scale used in the survey.

The Likert scale items allow a more fine-tuned response from the respondents than binary items including neutral answers. An odd number of alternatives is important in order to better portrait a fair number of alternatives including a neutral answer option to the respondent. (Bhattacharjee, 2012)

3.6 About the Analysis

In order to better compare and interpret the results from studies a scale is usually created. A scale is a better way to describe a construct compared to single questions, due to with a scale the validity and reliability are higher. For instance, fifty question could be asked a person in order to understand how that person feels about a particular thing. This, however, will be rather time consuming and inefficient timewise. With a scale one can reduce the number of questions based on which are the most relevant for the construct in question. E.g. ask about how sad, happy and regretting a person feels about the same thing instead of all the fifty questions.

The analysis of the data from the questionnaire was analysed using the PLS-SEM application Smart-PLS and the results are reported in the chapter 4 Results on page 25.

3.6.1 About Reliability and Validity

Validity is a to what degree a measure provides an accurate representation of what was intended to be measured. (Hair, Black, Babin, Anderson, & Tatham, 2010) There are two components of validity, systematic error and variable error. A systematic error, which is also known as bias, is a consistent manner occurring during each measurement. An example of a biased question is a question which would produce an error in the same direction every time the question was asked. A variable error occurs randomly when the question is asked. An example of a variable error is an answer that is less favourable than the true feeling due to a temporary characteristic, such as the respondent was in a bad mood. The error would not occur each time the attitude of that individual is measured. In addition, the same is true if the individual would be in a good mood, then the error would be in the opposite direction and would be overly favourable. (Hocevar & Benson, 1985) All reliability and validity values are presented in chapter 4 Results.

First of all, the simplest form of validity is called Face validity. It refers to whether an item is able to measure an underlying construct. (Bhattacharjee, 2012) In this study the face validity was ensured by testing the items on interviewees knowledgeable of the application.

The factor loadings indicate how much each items weight on each construct. The factor loadings are referred to as validity coefficients and can by multiplying the factor loading times the observed variable score be used to indicate how much of the observed variable score variance is valid. (Schumacker & Lomax, 2016). In this study item validity is shown with the factor loadings in chapter 4 Results. The size of the factor loading is one important consideration. In the case of high convergent validity, high loadings on a factor would indicate that they converge on a common point, the latent construct. Standardized loading estimates should be above 0.50 or higher, and ideally 0.70 or higher. (Hair, Black, Babin, Anderson, & Tatham, 2010)

Composite Reliability (CR) is assessed to evaluate the construct measures' internal consistency reliability. CR indicated how well constructs in the measurement model are described by the indicators. Chin, W.H. (1998) recommend a threshold of 0,7 and

that values above this number are considered well described by the indicators. CR provides a more appropriate measure of internal consistency reliability, than e.g. Cronbach's α , due to two reasons. First, unlike Cronbach's α CR does not assume that all indicator loadings are equal in the population, which is in line with the working principle of the PLS-SEM algorithm that prioritizes the indicators based on their individual reliabilities during model estimation. Secondly, Cronbach's α is sensitive to the number of items in the scale and generally tends to underestimate internal consistency reliability (Hair, Black, Babin, Anderson, & Tatham, 2010) (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014). The formula for CR is:

$$P_{cr} = \frac{(\sum_i l_i)^2}{(\sum_i l_i)^2 + \sum_i var(e_i)}$$

Convergent validity is a measurement to investigate the closeness between two related constructs. It explains how two constructs converges. The opposite measurement is discriminant validity. It refers to how a construct discriminates from other constructs that it is not supposed to measure. Usually, convergent validity and discriminant validity are assessed jointly for a set of related constructs. (Bhattacharjee, 2012) The Average Variance Extracted (AVE) is a measurement of convergent validity and is calculated as the mean variance extracted from the loadings of the items on the construct. It is a summary indicator of convergence. AVE is calculated by the sum of standardised factor loadings squared (squared multiple correlations) for each item divided with the total number of items. The formula is:

$$AVE = \frac{\sum_{i=1}^n L_i^2}{n}$$

Hair et.al. (2010) describes it as: "the average squared completely standardized factor loading or average communality" and is measured for all latent construct in the measurement model. An AVE of less than 0.50 indicates that, according to the formula, more error remains, on average, in the items than the variance explained by the factor structure that was measured. For satisfactory discriminant validity, the square root of the AVE from the construct should be greater than the correlation shared between the construct and other constructs in the model (Fornell & Larcker, 1981).

The term reliability is used to refer to the degree of variable error in a measurement. Reliability is the extent to which a measurement is free of variable errors. This is reflected when repeated measures of the same stable characteristic in the same objects show limited variation. (Edwards & Kenney, 1946) (Bhattacharjee, 2012)

In the Structure Equation Modelling Collinearity Tolerance was checked for with PLS-SEM. In the context of PLS-SEM a tolerance value below 0.20 or the Variance Inflation Factor (VIF) lower than 5. Hair et.al. (2011) describe the conversion formula for collinearity tolerance level and VIF as:

$$VIF = \frac{1}{CT}$$

There are also additional functions to test for collinearity e.g. condition index (CI). However, the CI is not as simple to understand and not yet included in the PLS-SEM software application. (Hair, Hult, Ringle, & Marko, 2014)

The p value is attributed to Ronald Fisher and represents the probability of obtaining an effect equal to or more extreme than the one observed considering the null hypothesis is true (Fisher, 1925). In other words, it is a measurement of how extreme the observation is. The smaller the p value, the more unlikely the null hypothesis is. Therefore, the smaller the p value is the larger the significance (Biau, Jolles, & Porcher, 2010). Another way of measuring the significance of findings is by using a t value. A t-test assesses whether the means of two groups are statistically different from each other. This analysis is appropriate whenever you want to compare the means of two groups (Trochim & Donnelly, 2006).

To manage unreliable variable measurements and their effects a recommended solution is to multiple the dependent variable reliability and/or average of the independent variable reliabilities (Schumacker & Lomax, 2016). This formula gives an intuitive appeal and a truer score given the definition of the classical reliability, i.e. the proportion of true score variance accounted for given the observed scores. The formula for the equation is:

$$\hat{R}_{y.123}^2 = R_{y.123}^2 * r_{yy} * \bar{r}_{xx}$$

The R^2 value is a percentage of variance in the variable that is accounted for by association in the independent variable groups (Schumacker & Lomax, 2016). Researchers commonly use the coefficient of determination, i.e. R^2 value, to measure and evaluate the structural model (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014). This coefficient is a measure of the model's predictive accuracy and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values. The adjusted R^2 value (R^2_{adj}) is used as the criterion to avoid bias toward complex models. This criterion is modified according to the number of exogenous constructs relative to the sample size. (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014) The formula is:

$$R^2_{adj} = 1 - (1 - R^2) \left(\frac{n - 1}{n - k - 1} \right)$$

where n is the sample size and k the number of exogenous latent variables used to predict the endogenous latent variable under consideration. Regarding R^2 Hair et. al. states that:

“The R^2_{adj} value reduces the R^2 value by the number of explaining constructs and the sample size and thus systematically compensates for adding nonsignificant exogenous constructs merely to increase the explained variance.” (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014)

Therefore, it is not possible to interpret R^2_{adj} as R^2 . R^2_{adj} is used to compare PLS-SEM results involving models with different numbers of exogenous latent variables and/or data sets with different sample sizes. Hair et al. (2014) states that what can be considered high, medium or low values of R^2 depend on the research area. They say that:

"Whereas R² values of 0.20 are considered high in disciplines such as consumer behavior, in success driver studies (e.g., in studies that aim at explaining customer satisfaction or loyalty), researchers expect much higher values of 0.75 and above. In scholarly research that focuses on marketing issues, R² values of 0.75, 0.50, or 0.25 for endogenous latent variables can, as a rough rule of thumb, be respectively described as substantial, moderate, or weak (Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009)." (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014)

Hence in this study a R² value of 25% is considered a weak result, 50% moderate and 75% substantial.

Effect size F² is a measurement that tells the impact of change in the R² value when a specified exogenous construct is ignored in the model. (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014). The formula for calculating is F² is:

$$f^2 = \frac{R_{included}^2 - R_{excluded}^2}{1 - R_{included}^2}$$

where R²_{included} and R²_{excluded} are the R² values of the endogenous latent variable when a selected exogenous latent variable is included in or excluded from the model (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014). When assessing F² 0.02 represent small effects, 0.15 medium effects, and 0.35 large effects of the exogenous latent variable (Cohen, 1988).

In psychological research however, Cohen's (1988) conventions to interpret effect size is different. A F² >0.10 is thought to represent a weak or small association; a F² >0.30 is considered a moderate correlation; and a F² >0.50 is thought to represent a strong or large correlation (Bliwise, 2006).

Cohen's Standard	Effect Size (F^2)	Percentile Standing	Percent of Nonoverlap
	2.0	97.7	81.1%
	1.9	97.1	79.4%
	1.8	96.4	77.4%
	1.7	95.5	75.4%
	1.6	94.5	73.1%
	1.5	93.3	70.7%
	1.4	91.9	68.1%
	1.3	90	65.3%
	1.2	88	62.2%
	1.1	86	58.9%
	1.0	84	55.4%
	0.9	82	51.6%
LARGE	0.8	79	47.4%
	0.7	76	43.0%
	0.6	73	38.2%
MEDIUM	0.5	69	33.0%
	0.4	66	27.4%
	0.3	62	21.3%
SMALL	0.2	58	14.7%
	0.1	54	7.7%
	0.0	50	0%

Table 2: Effect size; Cohen's standard and translation to percentile standing and nonoverlap

Effect sizes can also be thought of as the average percentile standing of the average observed participant relative to the average control participant or be interpreted in terms of the percent of nonoverlap of the group's scores with those of the control group (Cohen, 1988). A F^2 of 0.0 indicates that the mean of the group is at the 50th percentile of the control group or with 0% nonoverlap. A F^2 of 0.8 indicates that the mean of the group is at the 79th percentile of the control group or a 47.7% nonoverlap. See Table 2 for the complete table.

3.6.2 Error sources

In this study there are a number of topics that involve factors that might have had an effect on the results. In this chapter the main topics will be explained and discussed.

To give negative responses or give embarrassing comments about oneself, family, friends or employees might affect an interviewee's answers (Bhattacharjee, 2012). This is called social desirability bias. Bhattacharjee (2012) states:

"This tendency among respondents to "spin the truth" in order to portray themselves in a socially desirable manner is called the "social desirability bias", which hurts the validity of response obtained from survey research." (Bhattacharjee, 2012)

In a questionnaire setting there are no practical way around this type of bias. In an interview format however, the interviewer is able to spot inconsistent answers and ask the interviewee to develop and ask probing questions or take notes on personal observations. In context on this thesis the number of "self-damaging" and sensitive

questions were limited and the questionnaire was further developed to work as in an interview format in order to reduce this type of bias.

Recall bias is when the respondent does not properly remember their motivations or behaviour. This bias is particularly observed when dealing with events that happened in a distant past or under special circumstances. In the context of this thesis the interview setting was set up to reduce this type of bias. As recall bias is common in responses to survey questions that are based on e.g. the interviewees' motivation and memory (Bhattacharjee, 2012). Due to that user's attitudes were the central input in this survey the recall bias need to be addressed. In addition, it is possible that in some interviews there might have been an ambiguity in which functionality the questions referred to. However, the interviewer tried to minimizing the impact by going from one topic to the next in a very clear-cut way and therefore also ask the interviewees to separate the different topics. Thereby the impact of recall bias on the result was reduced.

Having KTH students as a sub-sample group and using English language in the survey and during the interviews lost most of the interviewee's native language. Many Swedish students at university level are comfortable speaking English and therefore this setting was chosen in order to include the international students at KTH in the sample as well. Furthermore, most of the interviewees speak English as a second language. However, this have definitely affected the results due to communication error. The impact on the results were limited by printing the questions on a computer screen and having the interviewees asking questions to clarify if the statements were not fully understood. When a miscommunication was suspected by the interviewer the interviewee was asked to reformulate the question and further develop the answer.

In addition to miscommunication the framing effects would also have impact on the results. How a question is asked affect how it is received and research has shown that very small changes affect the outcomes (Tversky & Kahneman, 1981) (Tversky & Kahneman, 1986). Therefore, this type of error is hard to control for. It is very hard to control how an interviewee interprets the questions. In order to try to reduce the impact the interviewer asked the interviewee to ask questions if there were any ambiguities.

In order to describe the behaviour of human beings as good as possible a researcher need to describe the observed reality with the right parameters. In this study it is highly possible that there are parameters missing due to limitations and delimitations and therefore the human behaviour is not explained fully. The number of parameters included during the model specification stage could be a potential error source; i.e. not taking into account more attitude constructs related to use of digital knowledge platforms might have affected the results and conclusion of the study.

4 Results

In this chapter the results from the study is presented and explained. The background, formulas and explanations for each statistic is explained in chapter 3.6.1 About Reliability and Validity. Below follow the results from analysis of the measurement model, CFA and after that the SEM analysis of the structured model.

4.1 Measurement model and CFA

The factor analysis is illustrated by the items and loadings in Table 3: The loadings of the items reflecting the model.

	Innovative Functionality	Continue to use	Control	Ease of use	Motivation	Perceived usefulness
EOUC				0,621*		
EOUH				0,798		
EOUI				0,713		
INUD					0,678*	
INUE					0,737	
INUG					0,793	
INUH					0,678*	
INUJ		0,9				
INUK		0,891				
INUL		0,919				
PERUD	0,72					
PERUER	0,815					
PERUG			0,86			
PERUH			0,84			
PERUI			0,72			
PERUJ						0,739
PERUK						0,811
PERUL						0,793

Table 3: The loadings of the items reflecting the model.

Note *) Items with lower loadings are marked.

Sufficient loadings have been discussed previously when the formulas were introduced in chapter 3.6. Note that some of the items in Table 3 (marked with *) does not have a loading above 0.7 which is the preferred level, indicating a sufficient loading according to the formula. However, lower loadings between as low as 0.4 and 0.7 can be used if the Composite Reliability (CR) (see below) and Average Variance Extracted (AVE) (see below) is high enough for the corresponding item (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014). If not, the item should be eliminated from the scale if it will result in an increase in the composite reliability or the AVE.

Composite Reliability (CR) over 0.7 and convergent validity shown with Average Variance Extracted (AVE) higher than 0.5. Therefore, all the loadings can be accepted (Hair, Hult, Ringle, & Sarstedt, A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), 2014).

	Composite Reliability	Convergent Validity
Innovative Functionality	0,742	0,591
Continue to use	0,930	0,816
Control	0,850	0,655
Ease of use	0,756*	0,510*
Motivation	0,814*	0,523*
Perceived usefulness	0,825	0,611

Table 4: The Composite Reliability and convergent validity (by Average Variance Extracted) for the study.

Note*) Constructs with items which lower loadings from Table 2 are marked.

Discriminant validity was assessed according to the Fornell-Larcker Criterion. It is at a satisfactory level if the square root of the AVE from the constructs should be greater than the correlation shared between the construct and other constructs in the model.

	Innovative Functionality	Continue to use	Control	Ease of use	Motivation	Perceived usefulness
Innovative Functionality	0,769					
Continue to use	0,495	0,903				
Control	0,068	0,132	0,809			
Ease of use	0,544	0,549	0,109	0,714		
Motivation	0,657	0,572	0,362	0,548	0,723	
Perceived usefulness	0,368	0,643	0,216	0,404	0,521	0,782

0,769 0,903 0,809 0,714 0,723 0,782

Table 5: Discriminant validity according to the Fornell-Larcker Criterion.

Discriminant validity is hence also recognised, as can be seen by the values presented in Table 5.

4.2 Structure model and SEM analysis

Below are all values and calculated measurements related to the structure model presented. All measurements and how they are calculated is presented in chapter 3.6.1 About Reliability and Validity.

The path coefficients for the model is shown in Table 6 with corresponding confidence level. Worth noticing are the paths Ease of use → Perceived usefulness,

Perceived usefulness → Continue to use and Innovative Functionality → Motivation with respectively 0.404, 0.43 and 0.469.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Motivation → Continue to use	0,203	0,199	0,08	2,538	0,011
Ease of use → Motivation	0,187	0,195	0,068	2,769	0,006
Perceived usefulness → Motivation	0,217	0,215	0,069	3,137	0,002
Ease of use → Continue to use	0,264	0,265	0,082	3,223	0,001
Control → Motivation	0,261	0,259	0,074	3,544	0
Ease of use → Perceived usefulness	0,404	0,415	0,078	5,187	0
Perceived usefulness → Continue to use	0,43	0,435	0,075	5,745	0
Innovative Functionality → Motivation	0,469	0,461	0,068	6,927	0

Table 6: Path coefficients to the variables in the model and corresponding confidence levels.

In Table 7 the collinearity assessment is presented. The values presented in the table are VIF, which should be lower than 5 in order to be accepted.

	Innovative Functionality	Continue to use	Control	Ease of use	Motivation	Perceived usefulness
Innovative Functionality					1,428	
Continue to use						
Control					1,050	
Ease of use		1,468			1,479	1,000
Motivation		1,684				
Perceived usefulness		1,411			1,290	

Table 7: Evaluated collinearity between variables

In Table 8 the coefficients of determination, i.e. R^2 , is presented together with their corresponding confidence levels.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Continue to use	0,538	0,554	0,05	10,795	0
Motivation	0,621	0,635	0,051	12,105	0
Perceived usefulness	0,163	0,178	0,063	2,575	0,01

Table 8: Coefficient of determination and corresponding confidence levels

Notice that a R^2 of 0.538 and 0.621 is calculated for Continue to Use and Motivation respectively, which is regarded as a moderate result. The Perceived usefulness has a weaker result of 0.163.

In Table 9 is the entanglement of the variables shown with the calculated effect size presented with corresponding confidence levels.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Innovative Functionality → Motivation	0,406	0,421	0,154	2,633	0,009
Control → Motivation	0,171	0,189	0,109	1,567	0,118
Ease of use → Continue to use	0,103	0,116	0,072	1,422	0,156
Ease of use → Motivation	0,063	0,078	0,05	1,257	0,209
Ease of use → Perceived usefulness	0,195	0,224	0,098	1,987	0,048
Motivation → Continue to use	0,053	0,061	0,046	1,142	0,254
Perceived usefulness → Continue to use	0,284	0,306	0,11	2,571	0,01
Perceived usefulness → Motivation	0,097	0,108	0,069	1,409	0,159

Table 9: Effect size and corresponding confidence levels

4.2.1 Indirect effects, mediation and total effects

In addition to the direct effect there are also indirect effects. Below are the results on the indirect effects in the model. As can be seen in Table 10 the main one worth mentioning is the EOU on CTU which is 2,4 to 4 times larger than the others.

	Innovative Functionality	Continue to use	Control	Ease of use	Motivation	Perceived usefulness
Innovative Functionality		0,095				
Continue to use						
Control		0,053				
Ease of use		0,230			0,088	
Motivation						
Perceived usefulness		0,044				

Table 10: Indirect effects

For the mediation effect analysis Sobel Test Calculator (Soper, 2016) to test significance of mediation effects (Lowry & Gaskin, 2014) was used. From the model the direct impact without the mediator was given as well as the direct impact with the mediator with their corresponding A, B, SEa and SEb values. The output from bootstrapping and calculations, for the two relevant combinations of constructs, are shown in Table 11: PU mediation input data Sobel Test Calculator.

		PU Mediate EOU on CTU		PU Mediate EOU on Motivation	
	Direct impact with no Mediator	0,339	Direct impact with no Mediator	0,247	
	Direct impact with Mediator	0,264	Direct impact with Mediator	0,187	
A	IV → Med Beta	0,404	IV → Med Beta	0,404	
B	Med → DV Beta	0,43	Med → DV Beta	0,217	
SE					
A	IV → Med SE	0,08	IV → Med SE	0,08	
SE					
B	Med → DV SE	0,073	Med → DV SE	0,066	

Table 11: PU mediation input data Sobel Test Calculator

The absolute value of the Sobel Test should be greater than 1.96 or the probability should be lower than 0.05 for two tailed test (Lowry & Gaskin, 2014). In the tested model the extracted values are 3.88 and 2.75 and for the two tailed probability is 0.0001 and 0.0368 which are shown in Figure 9: The Sobel test calculator results below.

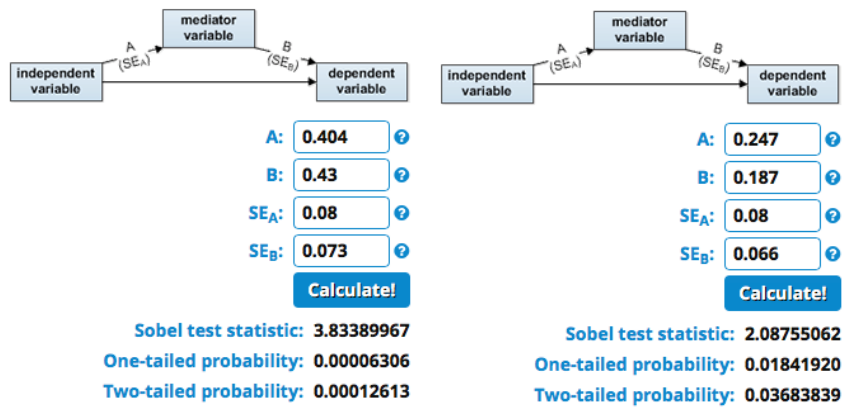


Figure 9: The Sobel test calculator results from PU

These results show that mediation effects exist in the model. Since the mediation has a decreasing impact on the direct link and both direct and indirect links have significant coefficients ($P < 0,05$) partial mediation exists.

In Figure 10 the indirect effects from the construct Motivation on CTU is calculated.

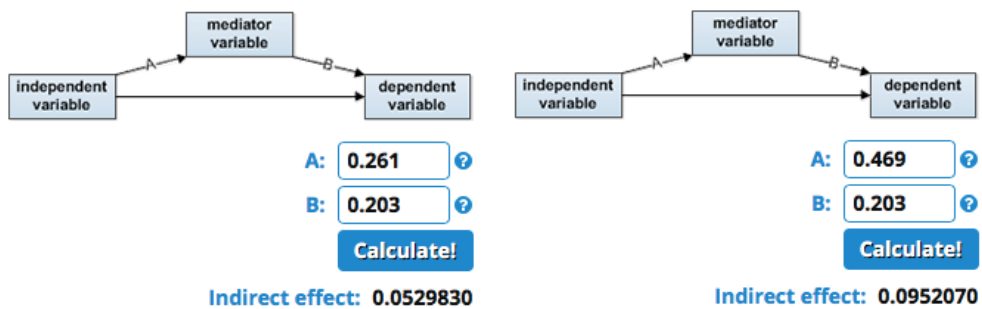


Figure 10: The Indirect Effect calculator results from Control (left) and Advanced Functionality (right) via Motivation to CTU

The results in Figure 10 show an indirect effect of 0.053 and 0.095 respectively.

The direct effects in Table 10 and the mediated effects in Table 11 and are shown as total effects in Table 12: Total effects, a summary of direct effects and indirect effects.

	Innovative Functionality	Continue to use	Control	Ease of use	Motivation	Perceived usefulness
Innovative Functionality		0,095			0,469	
Continue to use						
Control		0,053			0,261	
Ease of use		0,494			0,275	0,404
Motivation		0,203				
Perceived usefulness		0,474			0,217	

Table 12: Total effects, a summary of direct effects and indirect effects

4.3 Summary of results

In order to get a better overview, the results are also illustrated in Figure 11 with the path significances and R^2 of the relevant constructs.

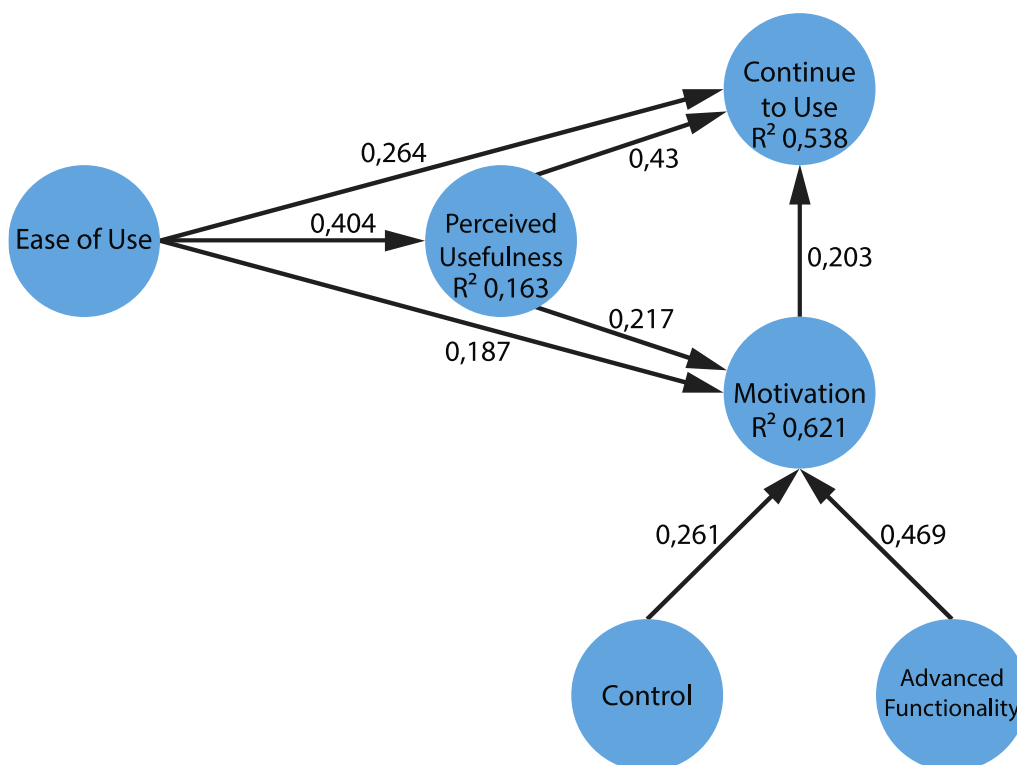


Figure 11: Model with path coefficients and R^2

In Figure 11 are also the path significances shown and it possible to conclude that the following can be concluded regarding the hypotheses:

The null-hypothesis H0: There are no significant effects on users' intention to CTU a knowledge management platform based on PU, EoU or the user's Motivation to do so. Can be rejected and proven to be not true.

The hypotheses that can be consider to have a strong impact are:

H1: PU impacts the user's intention to CTU the knowledge management platform.

H2a: EoU impacts the PU of the knowledge management platform.

While the following hypotheses can be consider to have a lower impact.

H1a: PU impacts the user's Motivation to use the knowledge management platform.

H2: EoU impacts the user's intention to CTU the knowledge management platform.

H2b: EoU impacts the user's Motivation to use the knowledge management platform.

H3: Motivation impacts the user's intention to CTU the knowledge management platform.

Regarding the mediation effects H3a: Motivation mediates the positive effects of Control on CTU. And H3b: Motivation mediates the positive effects of Innovative Functionality on CTU.

These hypotheses has no support in the model and are therefore rejected.

5 Discussion and Future Research

As mentioned earlier there are a number of limitations that impact this thesis and that need to be addressed. First and foremost, due to that the sample was taken from one University the sample can be seen as too narrow. However, the scope is to investigate the students' intentions and attitudes and from this point of view one could argue that the sample is representative from a technical students' perspective.

In addition, the number of belief factors included in the model are not many and as have been shown by many researchers the users' beliefs are very important for the actual usage of the system. Therefore, the results from this study should be interpreted and accepted with caution. A future investigation would be to further develop the relation between user control and innovative functionality on motivation with other control parameters. For example, it would be interesting to follow up this study with testing before and after hands-on use of the knowledge management platform, in order to find new paths and parameters that could be added to the model.

Innovative functionality had a significant effect on Motivation but was not mediated to Continue to Use. This, could be interesting to further develop in combination with other factors affecting Motivation. Additionally, the results tell that the mediation of Control to CTU and Innovative Functionality to CTU via Motivation was rendered not very significant. However, further studies on user control in information system research would be beneficial in order to confirm the results. The same applies to Innovative Functionality and the perceived usefulness of innovative functionalities in Information System research.

The weak result of R^2 for PU make it clear that the PU of the model is only explaining a smaller part of the variation in the answers. The weak results for PU could be because of the items for PU does not explain the construct well enough. A small but reliable relationship is presented. However, scaling the study could prove or disprove the hypothesis.

As stated earlier, previous research (Chaari, 2014) has found that online consumers and recipients of online communication can no longer be considered as passive. For instance, the consumers become responsible to decide what topic should be included by the firm; they can also negotiate and participate actively in the production product and information. By adopting this conception, a new understanding to the relation between a vendor and consumer in online environment can be explored. This understanding must place the consumer in the centre of firm's consideration as active and independent actor. By applying a control construct to the model and investigating the users' ability to control sharing options, an investigation to whether control of sharing thoughts, ideas and insights affected the motivation to use the platform. However, the results from the survey reveal that to significant path was found between the constructs Control and Motivation. There are a lot of reasons for control to impact motivation. However, in this sample the data only mildly support the connection.

During the interviews a few interviewees mentioned the idea that by controlling access to results from studies and discussions may create a community were only a few had access to "the real truth". The idea that "information is to be free" and accessible for all were also mentioned. Therefore, the data might reflect the samples

opinion on information freedom and accessibility rather than the right to control who is accessing discussions and research results. This could also be a reason for the missing mediation effects that were expected in the model.

An additional aspect to consider are other controlling variables. For example, additional information might be found in the sample's different fields of research. Depending on the field of research, control (and idea of information freedom) and the usefulness of the more advanced functionalities in the platform might be considered differently. For example, a student studying law might feel more motivated by being able to control access and sharing as well as utilizing the advanced text related functionality than a software developer utilising Github and other sharing tools to achieve a productive workflow. The web design community for instance have a very high usage of open accessible material in comparison to e.g. lawyers, attorneys etc. Text heavy fields might have much greater need for control and innovative functionality than e.g. technical fields of study. Therefore, field of study might be a parameter to control for. In this study however the distinction between different fields of study was not incorporated in the research design. These effects must therefore be investigated further in other studies.

Previous research has found support for user computer self-efficiency act as a determinant of the user's perceived ease of use, both before and after hands-on experience of the system. (Venkatesh & Davis, 1996) Venkatesh adds "The link was justified on the basis that in the absence of direct system experience, the confidence in one's computer related abilities and knowledge can be expected to serve as the basis for an individual's judgment about how easy or difficult a new system will be to use." (Venkatesh, 2000) In even earlier research researchers have argued that the specific system will incorporate control over the user (Mathieson, 1991), which has not been obvious. Venkatesh (2000) gives an example:

"For instance, an item such as "I would find (particular system) easy to use" (e.g., "I would find Word easy to use") could result in a response wherein the respondent has taken into account constraints placed not only by system characteristics but also by availability of knowledge, resources, and opportunities—i.e., the underlying elements of control." (Venkatesh, 2000)

Therefore, to control for variables such as "IT savviness" or "IT experience" is expected to affect the results. This was however not controlled for in the study.

Regarding the PLS-SEM application there are a number of key points that need to be addressed. A fundamental problem in PLS-SEM is that the latent indicator variables, which always has some degree of measurement error, are combinations of the observed variables. This measurement error is present in the latent variable scores and is therefore ultimately also reflected in the path coefficients that are estimated using these scores. Hence a bias on the model estimates and therefore are the true path model relationships frequently underestimated, while the parameters for the measurement models (i.e., the loadings and weights) typically are overestimated. This property is referred to as the PLS-SEM bias. In theory the latent variable case values converge on their true values and the bias disappear. The phenomenon is in general referred to as consistency at large (Lohmöller, 1989). However, simulation studies to test for these effects show that the PLS-SEM bias is usually at very low levels and is therefore of limited relevance in most empirical settings (Reinartz, Haenlein, & Henseler, 2009).

In relation to the application used for the analysis and the statistical measurements produced there are a few points to add based on the sample size and the number of indicators per latent variable. Ever since the first rule of thumb for estimating a minimal number of indicators per latent variable was suggested by Nunnally (1967) rules of thumb has been debated. Studies has been conducted on the topic and the rules has been put to the test. Goodhue et al. (2006) (2007) have been discussing whether the PLS-SEM technique is able to detect small or medium effects at small sample sizes. However, in regard to the pretty simple model and since the sample for this study is rather on the small size, these smaller and medium effect should be accepted, but with reservation.

Mick and Fournier (1998), based on extensive qualitative research on peoples' reactions to technology, identified eight technology paradoxes with which consumers have to cope: control/chaos, freedom/enslavement, new/obsolete, competence/incompetence, efficiency/inefficiency, fulfils/creates needs, assimilation/isolation, and engaging/disengaging. As these paradoxes imply, technology may trigger both positive and negative feelings (e.g. in describing the competence/incompetence paradox, Mick and Fournier state that technology can facilitate feelings of intelligence or efficacy, and it can also lead to feelings of ignorance or ineptitude.) (Mick & Fournier, 1998) It would be interesting to see how these paradoxes are affecting the use of digital knowledge platforms usage.

6 Conclusion

The primary object with this thesis study was to investigate the users' Intention to Continuously Use (CTU) an application based on Perceived Usefulness (PU), Perceived Ease of Use (EOU) among students at KTH in Stockholm. The results show that PU and EOU have significant effect on CTU which is in alignment with previous studies. Furthermore, the study also included an investigation around how control and the application's Innovative Functionality affects the users' motivation to use the application. The results of the study show that motivation has a significant effect on CTU. In addition, the results show that the usefulness of the Innovative Functionality and perceived control are significant to the construct of motivation.

The results also show the existence of a partial mediating effects. PU mediate EOU on CTU and PU mediate EOU on motivation. The mediation effects found in the model are small but statistically significant. In addition, no significant path was found between Control and CTU or Innovative Functionality and CTU. However, both innovative functionality and control had significant paths to motivation. Further studies on user control and innovative functionality in digital platforms would be appreciated to confirm the results.

Reviewing the research questions from chapter 1.2 it can be concluded that the main aspects to consider when developing a digital platform for building and sharing knowledge is the perceived usefulness and ease of use. In other words, focus on usability and improving the user experience. To keep in mind also, is that for users to accept the platform and continue to use it there must be some support and motivation for the user to share knowledge. What this motivation is depend a lot of the individual beliefs. From the study, there is some support for control and innovative functionality along with perceived usefulness and ease of use have a positive effect on motivation to use a digital platform for knowledge building and knowledge sharing.

7 Reflections

The knowledge management in academia is a very rigid system. Students have for a long time adapted their learning methodology to better and quicker improve their learning curve. An application and method that enable students and teachers to more efficiently spread knowledge is highly sought after, by both students and teachers. An application that enables overview, traceability, transparency and trust between the users, the public and internally within academia, is an important tool to eliminate mistakes both in the practical fields, e.g. medicine, as well as philosophical fields. In my personal opinion, this is a very important step for academia to better transparency and improve trust with the public.

Motivation is a concept that is hard to understand fully. What motivates people is usually considered a very personal, subjective idea and therefore a very hard construct to separate into variables that include all variations. To further develop this study, the constructs should to be supplemented to further include additional constructs. Furthermore, additional paths are explored with the data from the study.

In order to better understand the generalization aspects of the study and to further investigate students' attitudes towards different functionality on knowledge management platforms other researchers might consider doing the same experiment on other universities. In addition, the qualitative studies made, e.g. (Mick & Fournier, 1998), could be further included in this study, to improve the model.

8 Acknowledgements

I would first like to thank my thesis advisor Lect Henrik Blomgren of the School of Industrial Engineering and Management at the Royal Institute of Technology.

I would also like to give a big thank you to PhD Amirhossein “Nima” Emamjomeh who assisted with his expertise in the research project. Without his passionate participation and input, the validation survey could not have been successfully conducted.

I would also like to acknowledge Mr Stephen Kirk as the second reader of this thesis, and I am grateful to him for his very valuable comments on this thesis.

Finally, I must express my very profound gratitude to my grandfather, my girlfriend and my mentor for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

Markus Forsberg

9 References

- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliff, NJ: Prentice-Hall.
- Artino, A. R., & Jones, K. D. (2012). Exploring the complex relations between achievement emotions and self-regulated learning behaviors in online learning. *The Internet and Higher Education*, 15(3), 170-175.
- Balasubramanian, B. (2012). Likert Technique of Attitude Scale Construction in Nursing Research. *Asian Journal Nursing Education and Research*, 2(June), 65-69.
- Barsaam, P., Berg, P., Hagman, A., & Scandurra, I. (2016). Internet of Things Technology for Remote Healthcare – A Pilot Study. *14th Scandinavian Conference on Health Informatics*. 122, pp. 43-48. Gothenburg, Sweden: Proceedings from The 14th Scandinavian Conference on Health Informatics 2016, Gothenburg, Sweden, April 6-7 2016. No. 122. Linköping University Electronic Press.
- Benbasat, I., & Barki, H. (2007). Quo vadis, TAM? *Journal of the Association for Information Systems*, 8(4), 211-218.
- Bhatiasevi, V. (2011). Acceptance of E-learning for users in higher education: an extension of the technology acceptance model. *The Social Sciences*, 6(6), 513-520.
- Bhattacharjee, A. (2012). *Social Science Research principles, methods, and practices* (2nd edition ed.). Tampa, Florida, USA: USF Tampa Library Open Access Collections.
- Biau, D. J., Jolles, B. M., & Porcher, R. (2010). P value and the theory of hypothesis testing: An explanation for new researchers. *Clinical Orthopaedics and Related Research*, 468(3), 885-892.
- Bliwise, N. G. (2006, 07 07). <http://www.psychology.emory.edu>. Retrieved 05 07, 2016, from <http://www.psychology.emory.edu/clinical/bliwise/Tutorials/SCATTER/scatterplots/effect.htm>
- Bröhl, C., Nelles, J., Brandl, C., Mertens, A., & Schlick, C. M. (2016). TAM Reloaded: A Technology Acceptance Model for Human-Robot Cooperation in Production Systems. In C. Stephanidis (Ed.), *18th International Conference* (pp. 97-103). Toronto: HCI International.
- Chaari, L. (2014). The Role of Communication in Online Trust: The Communicative Action Theory Contribution. In ????, *User Behavior in Ubiquitous Online Environments* (pp. 106-108). ???: ???
- Chen, C. W., Chang, M. L., Tseng, C. P., Chen, B. C., & Chang, Y. Y. (2013). Critical human factor evaluation of knowledge sharing intention in Taiwanese enterprises. *Human Factors and Ergonomics in Manufacturing and Service Industries*, 23(2), 95-106.
- Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior*, 26(4), 741-752.
- Chen, Y. C., Lin, Y. C., Yeh, R. C., & Lou, S. J. (2013). Examining factors affecting college students' intention to use web-based instruction systems: towards an integrated model. *Turkish Online Journal of Educational Technology (TOJET)*, 12(2), 111-121.
- Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: an extension of the technology acceptance model for E-learning. *Computers and Education*, 63, 160-175.

- Child, D. (1990). *The essentials of factor analysis* (2nd ed. ed.). New York, NY, USA: Cassell Educational.
- Chin, W. H. (1998). Partial least squares approaches to structural equation modeling. In G. A. Marcoulides, *Modern methods for business research* (pp. 295-336). (pp. 295-336). Mahwah, NJ: Lawrence Erlbaum.
- Cho, S.-E. (2010). Perceived risks and customer needs of geographical accessibility in electronic commerce. *Electronic Commerce Research and Applications*, 9(6), 495-506.
- Chowa, M., Heroldb, D. K., Chooc, T.-M., & Chana, K. (2012). Extending the technology acceptance model to explore the intention to use second life for enhancing healthcare education. *Computers and Education*, 59(4), 1136-1144.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Edition ed.). Hillsdale, NJ: Lawrence Earlbaum Associates.
- Davis, F. D. (1986). *A technology acceptance model for empirically testing new enduser information systems: Theory and results*. Sloan School of Management. Cambridge, MA: Massachusetts Institute of Technology.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of of information technology. *MIS Quarterly*, 13, 319-340.
- Davis, F. D. (1993, 38). User acceptance of information technology: System characteristics, user perceptions and behavioural impacts. *International Journal of Man-Machine Studies*, 475-481.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35, 982-1003.
- Edwards, A. L., & Kenney, K. C. (1946). A comparison of the Thurstone and Likert techniques of attitude scale construction. *Journal of Applied psychology*, 30, 72-83.
- Fathema, N., Ross, M., & Witte, M. M. (2014). Student Acceptance of University Web Portals: A Quantitative Study. *International Journal of Web Portals (IJWP)*, 6(2), 58.
- Fathema, N., Shannon, D., & Ross, M. (2015). Expanding The Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) In Higher Education Institutions. *MERLOT Journal of Online Learning and Teaching*, 11(2), 210-232.
- Fishbein, M., & Ajzen, I. (1975). *Belief attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fisher, R. (1925). *Statistical Methods for Research Workers*. Edinburgh, UK: Oliver and Boyd.
- Fornell, C., & Larcker, D. F. (1981). Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics. *Journal of Marketing Research*, 18(3), 382-388.
- Goodhue, D. L., William, L., & Thompson, R. (2007). Statistical power in analyzing interaction effects: questioning the advantage of PLS with product indicators. *Information Systems Research*, 18(2), 211–227.
- Goodhue, D., William, L., & Thompson, R. (2006). PLS, Small Sample Size, and Statistical Power in MIS Research. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS'06)*. 8, p. 202. Hawaii: HICSS.

- Gulamhuseinwala, I., Bull, T., & Lewis, S. (2015, Winter). FinTech is gaining traction and young, high-income users are the early adopters. *The Journal of Financial Perspectives*, 16-23.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate Data Analysis*. Upper Saddle River, New Jersey: Prentice Hall.
- Hair, J. F., Hult, G. T., Ringle, C., & Marko, S. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Thousand Oaks: SAGE Publications.
- Hair, J. F., Hult, G. T., Ringle, C., & Sarstedt, M. (2014). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. Los Angeles: Sage Publication.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–151.
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. *European Business Review*, 26(2), 106-121.
- Hayat, A., Ahmed, A., Tariq, T., & Safdar, H. (2013, May). Second life (SL) in education: the intensions to use at university of bahrain. In *e-Learning "Best Practices in Management, Design and Development of e-Courses: Standards of Excellence and Creativity"* (pp. 205-215). Bahrain: IEEE.
- Hershkovitz, A., & Nachmias, R. (2011). Online persistence in higher education web-supported courses. *Internet and Higher Education*, 14(2), 98-106.
- Hocevar, D., & Benson, J. (1985). The Impact Of Item Phrasing On The Validity Of Attitude Scales For Elementary School Children. *Journal of Educational Measurement*, 22(3), 231-240.
- Huang, C.-Y., Wu, H.-H., & Lu, H.-H. (2016). A MCDM Methods Based TAM for Deriving Influences of Privacy Paradox on User's Trust on Social Networks. *Trends in Applied Knowledge-Based Systems and Data Science - Lecture Notes in Computer Science*. 9799, pp. 356-363. Taiwan: Springer.
- Hung, S. W., & Cheng, M. J. (2013). Are you ready for knowledge sharing? An empirical study of virtual communities. *Computers and Education*, 62, 8-17.
- Jameson, J. (2009). Distributed Leadership, Trust and Online Communities. *Online Communities and Social Computing (LNCS 5621)* (pp. 226-235). Heidelberg: Springer-Verlag.
- Kardooni, R., Yusoff, S., & Kari, F. B. (2016, January). Renewable energy technology acceptance in Peninsular Malaysia. *Energy Policy*, 88, 1-10.
- Lee, Y., Kozar, K. A., & Larsen, K. R. (2003). The Technology Acceptance Model: Past, Present, and Future. *Communications of the Association for Information Systems*, 12(50), 752-780.
- Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology*, 22(140), 55.
- Liu, X. (2010). Empirical testing of a theoretical extension of the technology acceptance model: an exploratory study of educational wikis. *Communication Education*, 59(1), 52-69.
- Lohmöller, J. (1989). *Latent Variable Path Modeling with Partial Least Squares*. Heidelberg, Germany: Physica-Verlag.
- Lowry, P. B., & Gaskin, J. (2014). Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it. *IEEE Transactions on Professional Communication*, 57(2), 123-146.

- Ma, W. W., & Chan, A. (2014). Knowledge sharing and social media: altruism, perceived online attachment motivation, and perceived online relationship commitment. *Computers in Human Behavior*, 39, 51-58.
- Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3), 173-191.
- Mick, D. G., & Fournier, S. (1998). Paradoxes of Technology: Consumer Cognizance, Emotions, and Coping Strategies. *Journal of Consumer Research*, 25(2), 123-143.
- Ngai, N., Poon, J., & Chan, Y. (2007). Empirical examination of the adoption of WebCT using TAM. *Computers and Education*, 48, 250-267.
- Nunnally, J. C. (1967). *Psychometric Theory*. New York, NY, USA: McGraw-Hill.
- Okumus, F. (2013). Facilitating knowledge management through information technology in hospitality organizations. *Journal of Hospitality and Tourism Technology*, 4(1), 64-80.
- Oxforddictionaries.com. (2016, 06 06). <http://www.oxforddictionaries.com/>. Retrieved 06 06, 2016, from <http://www.oxforddictionaries.com/definition/english/information>
- Oxforddictionaries.com. (2016, 06 06). <http://www.oxforddictionaries.com/>. Retrieved 06 06, 2016, from <http://www.oxforddictionaries.com/definition/english/knowledge>
- Ozturk, A. B., Bilgihan, A., Nusair, K., & Okumus, F. (2016). What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use, and perceived convenience. *International Journal of Information Management*, xxx-xxx.
- Parasuraman, A. (2000). Technology Readiness Index (TRI) A Multiple-Item Scale to Embrace New Technologies. *Journal of Service Research*, 2(4), 307-320.
- Reinartz, W., Haenlein, M., & Henseler, J. (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. *International Journal of Research in Marketing*, 26(4), 332-344.
- Rodgers, D. L., & Withrow-Thorton, B. J. (2005). The Effect of Instructional Media on Learner Motivation. *International Journal of Instructional Media*, 32(4), 333-342.
- Sanches-Franco, M. J. (2010). WebCT – The quasimoderating effect of perceived affective quality on an extending Technology Acceptance Model. *Computers and Education*, 54, 37-46.
- Schumacker, R. E., & Lomax, R. G. (2016). *A Beginner's Guide to Structural Equation Modeling* (4th ed ed.). New York, NY, USA: Routledge.
- Scott, J., & Ghosh, B. (2007). Social capital in knowledge based business process outsourcing. *Proceedings of the 13th American Conference on Information Systems* (pp. 1-12). Keystone: Association for Information Systems (AIS).
- Shen, J., & Eder, L. B. (2009). Intentions to Use Virtual Worlds for Education. *Journal of Information Systems Education*, 20(2), 225-233.
- Siemens, E., Roth, A. V., & Balasubramanian, S. (2008). How motivation, opportunity, and ability drive knowledge sharing: The constraining-factor model. *Journal of Operations Management*, 26(3), 426-445.
- Soper, D. (2016, 08 23). *Sobel Test Calculator for the Significance of Mediation [Software]*. Retrieved 08 23, 2016, from <http://www.danielsoper.com/statcalc>
- Spector, P. E. (1992). Summated Rating Scale Construction: An Introduction. *Quantitative Applications in the Social Sciences*(07-082), .

- Thomke, S. (2007). *Managing Product and Service Development*. New York: McGraw Hill.
- Trochim, W. M., & Donnelly, J. P. (2006). *The Research Methods Knowledge Base* (3rd Edition ed.). Cincinnati, OH, USA: Atomic Dog Publishing.
- Tversky, A., & Kahneman, D. (1981). The Framing of Decisions and the Psychology of Choice. *Science*, *211*(4481), 453-458.
- Tversky, A., & Kahneman, D. (1986). Rational Choice and the Framing of Decisions. *The Journal of Business*, *59*(4), 251-278.
- Valenzuela, S., Park, N., & Kee, K. F. (2009). Is There social capital in a social network site?: Facebook use and college student's life satisfaction, trust, and participation. *Journal of Computer-Mediated Communication*, *14*(4), 875-901.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic, and Amotivation in Education. *Educational and Psychological Measurement*, *52*(4), 1003-1017.
- Wells, J. D., Campbell, D. E., Valacich, J. S., & Featherman, M. (2010). The effect of perceived novelty on the adoption of information technology innovations: A risk/reward perspective. *Decision Sciences*, *41*(4), 813-843.
- Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research* *11*, *11*(4), 342-365.
- Venkatesh, V., & Davis, F. D. (1996). Model of the Antecedents of Perceived Ease of Use: Development and Test. *Decision Sciences*, *27*(3), 451-481.
- Voiskounsky, A. E., Mitina, O. V., & Avetisova, A. A. (2009). Gamers' Implicit Knowledge on the Psychological Influence of Game-Playing. *Online Communities and Social Computing (LNCS 5621)* (pp. 632-640). Heidelberg: Springer-Verlag.

Appendix I – The Main Survey Items

In this appendix the final items in the questionnaire are listed. For details regarding how the survey was conducted see the Method chapter.

I am conducting or have conducted text heavy research (for example: thesis project, industrial project or literature study) at university or as a professional in a work environment?

I am conducting or have conducted text heavy research (for example: thesis project, industrial project or literature study) in a team at university or as a professional in a work environment?

I feel confident using the technical tools (for example: software such as Microsoft word excel etc, calculation tools, databases, PCs) in my everyday work activities?

When I am reading at work, I read digitally (e.g. on computer, tablet, or smartphone) rather than non-digitally (e.g. In paper form or hard copies).

My current reading method in my work environment is unsatisfying.

If or when I need to share research (publically or with specific people) I use digital tools such as E-mail, Box, Dropbox, Bilda, Facebook or Mendeley.

When sharing research, in the team or with a third party, controlling access to whom sees what is important.

When reading research texts, a free-drawing pen functionality is perceived as useful.

When reading research texts, a post-it functionality is perceived as useful.

The post-it functionality motivates me to continue using The Application.

When reading research texts, a page markers functionality is perceived as useful.

When reading research texts, a highlight functionality is perceived as useful.

The highlight functionality motivates me to continue using The Application.

When reading research texts, a heatmap functionality is perceived as useful.

The heatmap functionality motivates me to continue using The Application.

When reading research texts, an anchor functionality is perceived as useful.

The connect functionality digitally simulate the mental connections I had while reading.

When reading research texts, a Mindmap functionality is perceived as useful.
The Mindmap functionality motivates me to continue using The Application.
It is easy to discuss research when the chat is visually connected to the text in question.
The chat functionality discourages me to continue using The Application.
The booklet view illustrates the text in an easily comprehensible way.
The Note pad in the booklet view gives an overview of the notes related to the selected page in a understandable way.
When sharing texts, within the team or with a third party, controlling who sees what, is perceived as important.
When sharing ideas, within the team or with a third party, controlling who sees what, is perceived as useful.
When sharing insights, within the team or with a third party, controlling who sees what, is perceived as useful.
When reading research texts, a Digital Whiteboard functionality is perceived as pointless.
A digital whiteboard simplifies collaboration.
The Digital Whiteboard functionality motivates me to continue using The Application.
The sharing capabilities enables me to share with the appropriate people easily.
The sharing functionality, where I can control whom sees what, motivates me to continue using The Application.
Being able to control who sees what, when sharing, motivates me to continue using The Application.
Being able to share my thoughts and ideas motivates me to continue to use The Application.
The Application would enhance my effectiveness in doing a project.
The Application would improve my performance in doing a project.
The Application would increase my productivity in doing a project.
The Application lowers the threshold for building and sharing my knowledge digitally.
The Application seems complicated to use.
The Application does support my current working method.
I want to use The Application.
I want to use The Application in team projects.
My intention is to use The Application for projects in the future.

Age:

Male / Female / Other

General IT skills? Novice, Intermediate, Expert?

Prior experience of digital reading software tools? Minor (<1 year) (1), mediate (1-2 years) (2), major (>2 years) (3)

Email address:

Male / Female / Other

Table 13: All items in the questionnaire, where the ones used for this study marked with the corresponding label.