LUND UNIVERSITY

Master Thesis

Cognitive absorption and the behavioral intention to use business intelligence: Determinants and influence of cognitive absorption

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Abstract

Introduction: In the last decade Business intelligence became increasingly important for organizations to adopt in order to compete in highly changing industries. The main purpose of the business intelligence system is to enable users to make and execute decisions better and faster. However, the success of business intelligence is not guaranteed. Users are defined as one of the main sources of the potential issues, since they are the ones who should incorporate the new system into their work environment. Users interact with the system via business intelligence application, and for that reason, it is important to investigate users' behavioral intentions towards the application. In order to investigate users intentions, several theoretical constructs have been developed, mostly from the technology acceptance research. The main one being explored in this study is cognitive absorption.

Purpose: The purpose of this study is to test the theory presented in Agarwal and Karahanna (2000) in the new setting. The authors' theory proved the influence of the cognitive absorption in the context of the World Wide Web. We will use their theory in order to investigate the determinants and the influence of the cognitive absorption in the business intelligence context.

Method: This study is exploratory in nature. We used survey methodology - questionnaire for the hypotheses testing. We tested seven hypotheses based on the theoretical model adapted from the literature. Several statistical analyses have been conducted for measurement and hypotheses testing, and they have been performed in SPSS and SmartPLS software packages.

Conclusion: The results of the analysis identified playfulness as the significant determinant of the cognitive absorption with the business intelligence application. Furthermore, cognitive absorption proved to have the significant direct as well as indirect influence on the behavioral intention to use the business intelligence application.

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Furthermore, we would like to express our sincere gratitude to the representatives of the companies that agreed to answer and forward our questionnaire to the other BI application users.

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1. Introduction

In this section we present Business Intelligence and its importance for organizations, while also discussing issues which may occur during its adoption. Some of the research presenting the value of intrinsic motivators in the acceptance of technology is described. After defining our problem area, we present the research questions which arisen from it. Additionally, the purpose of our research as well as the scope and delimitations of the study are stated.

1.1. Background

In the last decade Business Intelligence (BI) became increasingly important for organizations to adopt in order to compete in highly changing industries, where BI is defined as "a collection of decision support technologies for the enterprise aimed at enabling knowledge workers such as executives, managers, and analysts to make better and faster decisions" (Chaudhuri, Dayal and Narasayya 2011, p. 88). As it can be seen from the definition, the use of BI applications aims at increasing the effectiveness of decision-making inside an organization, a process which represents a central part of any organizational activity. Blenko, Mankins and Rogers (2010) state how company's performance improves only with its ability to make and execute key decisions better and faster than its competitors. Additionally, BI aims to help in solving some of the common issues which may occur in the decision making process. Griffith, Northcraft and Fuller (2008) mention one of the issues as the unavailability of access to all critical information, leading to missing information and consequently to a wrong decision. As BI applications became available to use on mobile devices, the benefits it offers increased further. The new stage of mobility fulfilled the crucial need to have information available instantly at any time and place, next to other benefits such as improved sharing, flexibility, adaptability and quick response to any changes.

Despite these benefits it brings, the success of a BI system is not guaranteed. Watson and Wixom (2007) argue some of the prerequisites necessary in order to have a successful BI solution such as alignment between the business and BI strategies, strong senior management and providing users with necessary training and support. Since users are the ones having to utilize the BI applications in order to make the right decision, the way they perceive their interaction with BI is of great importance for successful adoption of these systems. Sichel (1997) discusses the "productivity paradox", or the conflict between the investment in IT and the organizational performance, stating how low adoption and low use of IT systems might be the main reasons for this conflict. Devaraj and Kohli (2003) further posit how the usage of a technology is the main factor influencing organizational performance. These types of beliefs about technology acceptance have been long present and explored, where researchers have been concerned with understanding users and their relationship with information technologies.

Besides factors like usage, the role of intrinsic motivation variables such as enjoyment, playfulness, self-efficacy etc. have been explored as important in the process of technology acceptance (Venkatesh and Davis (2000); Agarwal and Karahanna (2000); Yi and Hwang (2003)). Agarwal and Karahanna (2000) explore motivators such as enjoyment, control and

curiosity, and further present a construct called Cognitive absorption (CA). The authors defined is as a "state of deep involvement with software" (Agarwal and Karahanna 2000, p. 665). Their research showed how CA had a significant role in users' perceptions of information technology, however since the study was performed on student subjects in an educational institution, using a non-mandated technology, the generalizability of their results to other contexts is limited. For this reason, we will explore whether the effects of CA are still significant when exploring the relationship between users and BI in a work environment.

1.2. Problem Area

Several theoretical models have already been developed in order to try and understand user behaviors towards new IT and to explore the motivations of users when adopting new technology (Agarwal and Karahanna 2000). Some of the theories that deal with this issue are Technology Acceptance Model (TAM) and CA construct. TAM, more specifically, is used to address why users accept or reject a certain information technology and how is that acceptance influenced by the system characteristics (Davis 1993). On the other hand, CA captures one's individual experience when dealing with new software (Agarwal and Karahanna 2000).

By using the mentioned theories as a theoretical basis, questions relating to the relationship between users and BI applications will be explored. This understanding of a relationship between user behavior and the adoption of new information technology has not been explored in regards to BI as the target technology, where exploring factors which lead to the intention to use BI applications and their relationships will benefit both to theory and practice. The theory will benefit from expanding on the existing research on CA, and through adding to understanding on the importance of intrinsic motivators when working with mandatory technologies. The results of research will lead to implications for practice by empirically proving whether factors such as CA are of importance when dealing with BI applications. This knowledge can be used to understand whether these factors need to be considered when designing BI applications, and whether it will lead to better adoption of BI among users.

1.3. Research questions and purpose

Since the effect of CA has not been explored through the usage of BI applications, we firstly need to know which the factors that lead to CA when using BI applications are. Additionally, if results of our research show CA to be important influence on users' perceptions, determining how to achieve it will help in using the results of our research practically.

Thus, our first research question is:

1. What are the determinants of Cognitive absorption (CA) with regard to business intelligence (BI) applications?

Furthermore, in order to explore the relationship between users and BI applications, we need to see how CA influences users' behaviors and intentions towards using BI applications. Our second research question therefore examines:

2. What is the influence of Cognitive absorption (CA) on the behavioral intention to use business intelligence (BI) applications?

Bhattacherjee (2012) states how the purpose of science is to create scientific knowledge, referring to the use of theories to explain a phenomenon or behavior of interest through the use of a scientific method. Examining user behavior towards new information technology, or specifically towards BI, by using existing theoretical models will contribute with bringing new knowledge to the scientific community and lead to the development of better theories. Exploring the factors which influence the nature of involvement with BI, predicting the user's behavior and examining their intentions expands the already existing research on the relationship between information technology and users, giving researchers interested in this topic additional research foundations.

Additionally, usual goals of the researcher are developing new theories or testing existing ones. Therefore, the purpose of this study, besides expanding research on CA, is to test the theory developed by Agarwal and Karahanna (2000) and to empirically show whether it will lead to the same results when applied to BI.

1.4. Delimitations

The research will use BI as the target technology to be examined, in accordance with the definition provided by Chaudhuri et al. (2011) which is stated in the introduction. The aim is to explore the effects of BI inside an organization, with end users as the focus group for the research. BI end user can be defined as a person with or without technical skills operating at any level within the company, using a BI application through a desktop, tablet or smartphone device, acting as a decision maker and using information gained from the BI application in their decision making process. The results of the research will be limited by the number of individuals who fall within this definition and are chosen to be appropriate to participate in the questionnaire.

The paper concentrates of the concept of CA and its determinants and influence in the field of BI. In order to do so, all of the technological components and potential issues are ignored. The contact between users and BI is established through BI applications, and our theoretical model will be tested using the data collected from the BI application users. We consider BI application as specific software, for desktop computers or tablets and smartphones, designed to enable users to make decisions based on the data retrieved form the data warehouse.

1.5. Thesis Structure

The rest of the thesis will be structured as follows:

Chapter 2: Theoretical Background will explain the three main parts of the theory behind our research, namely Business Intelligence, Technology Acceptance Model and Cognitive Absorption. We will motivate our choice of the TAM and cognitive absorption as well as the choice of business intelligence as a target technology.

Chapter 3: Methodology discusses the research method and the data collection method used to achieve the results. Furthermore, this section illustrates how the questionnaire has been developed, how it has been administered and what was the criteria for the choice of the target population. Finally, we will address the research quality and ethics methods used to provide the reliability and validity of the research.

Chapter 4: Data analysis and results explains how the data was prepared for analysis and analyzed. Furthermore, we discuss the internal consistency, convergent validity, discriminant validity and outer model loadings which were used to test the measurement items. Descriptive statistics section describes statistically the respondents and the inferential statistics section explains the methods used for hypotheses testing and the results.

Chapter 5: Discussion of findings explains the results of the analysis in relation to the tested hypotheses, and differentiates between the ones that are proven and the ones that are not.

Chapter 6: Conclusion provides answers to our research questions, implications and limitations to our study as well as the suggestion for the future research.

2. Theoretical Background

In this section we will explain the theoretical foundation our research is based on. The first part will introduce and explain Business Intelligence. The second part of the theoretical background will introduce the Technology Acceptance Model, which has been widely used in the information systems research. We will explain the development of TAM and the constructs that are included in the model. Furthermore, we will explain the construct called cognitive absorption which is derived from the technology acceptance research. We will provide the definition of the construct, some of the key research and we will go into detail in the Agarwal and Karahanna (2000) explanation, since the purpose of our paper is to test the authors' theory about the determinants and the effects of cognitive absorption.

After introducing all of the theory that creates the foundation for our research, we will present our theoretical model and the hypotheses.

2.1. Business intelligence

Since our target technology is business intelligence (BI), we will present the historical development of the decision making, from Herbert Simon, who was the first one to define decision making as critical in managerial activities, to Decision Support Systems which are the predecessors of BI as a field. After introducing the BI, providing the definition and relating to the some of the key research in the field, we will explain some of the characteristics, possible benefits and issues. Moreover, we will explain our motivation for the choice of BI as a target technology by relating it to the some of the possible problems that can emerge and the importance of exploring the factors that affect the users' intentions towards BI.

2.1.1. Historical development

Simon (1976) stressed that decision making plays a critical role in managerial activities (Hosack, Hall, Paradice and Courtney 2012). Later in the 1960s, when the first scientific applications were created, decision making started to be supported by computers even though the information provided by those applications was limited (Watson 2009). Michael S. Scott Morton wrote his doctoral dissertation in 1967 and he was the one who popularized the name for these new applications that helped managers make decisions - management decision systems (Watson 2009). Shortly after, the term was replaced with Decision Support Systems (DSS) and although the new name was introduced in late 1960s, Shim, Warkentin, Courtney, Power, Sharda and Carlsson (2002) stated that DSS as a field is as old as the whole information systems field.

Even though the technology advancements such as Internet and Web based applications caused a lot of technological changes, many of the fundamental DSS concepts remained the same (Watson 2009). Additionally, the name evolved together with the technological capabilities. In 1989, Howard Dresner introduced a new name - DSS was replaced with Business Intelligence (BI).

Furthermore, since the microcomputer was introduced in the 1980s, BI applications were much more available to employees, thus the user base was larger.

Today, BI field is constantly changing, and as Watson (2009) stated, some of the changes are caused by technology advancements, others by different business needs. Furthermore, the declining costs of gathering, storing and analyzing large amounts of data enables some of the changes in BI (Chaudhuri et al. 2011). Watson (2009) identified several trends which are shaping the BI field today. Among them are predictive analytics, event analytics, BI gadgets, mobile BI, advanced data visualization and others. On the other hand, Mathew (2012) asserted that today's BI is being disrupted by five macro trends, namely big data, cloud computing, location intelligence, the social enterprise, and mobility. Above all, those trends and disruptions will shape the next generation of BI applications, although some of the fundamental concepts will remain the same (Mathew 2012).

2.1.2. Definition, potential benefits and issues

Today, there are many definitions of BI. The next one combines the three conceptual components that BI is composed of (process, product and technology):

"BI encompasses a set of tools, techniques, and processes to help harness this wide array of data and allow decision makers to convert it to useful information and knowledge." (Clark, Jones and Armstrong 2007, p. 589)

Tona (2014) defines BI as a concept which should provide the right information to the variety of users, at the right time and format, in order to enable the increase in the performance of a company in the context of decision-making.

On the other hand, Lundqvist (2013) talks about the term "intelligent business", which is considered as an advancement of the BI concept. He explains the shift as a consequence of the vast amounts of data available to companies. The author furthermore argues that intelligent business helps companies take advantage of big amounts of external data (data from outside of a company) and "capitalize on customer sentiment, buying patterns and economic indicators." (Lundqvist 2013).

Because the data comes from both external (the market, suppliers etc.) as well as internal (different departments in companies) sources, it brings certain problems such as data being different in quality, representation, format, where these types of problems need to be mitigated before any meaningful decision could be made (Chaudhuri et al. 2011). Other source of the potential issues could be users themselves. They are the ones that need to incorporate the new BI system into their work routines. In their longitudinal post adoptive study, Deng and Chi (2012) identified several sources of potential problems which, if unresolved, can limit the use and the potential benefits of the new system. The authors' data analysis put several user related constructs on the display as the potential problem sources- role authorization, users' lack of knowledge and user-system interaction.

However, BI, if properly implemented and used, can provide many benefits for the companies. Watson and Wixom (2007) identified several:

- cost savings
- time savings
- more and better information
- improvement of business processes
- support for the accomplishment of strategic business objectives

The value of BI is delivered through BI applications for desktop, tablet or smartphone. There are many providers of BI applications. However, all of the applications are created as dashboards that enable users to see different reports, for the criteria they choose. The example of the BI desktop dashboard can be seen in the figure 2.1.

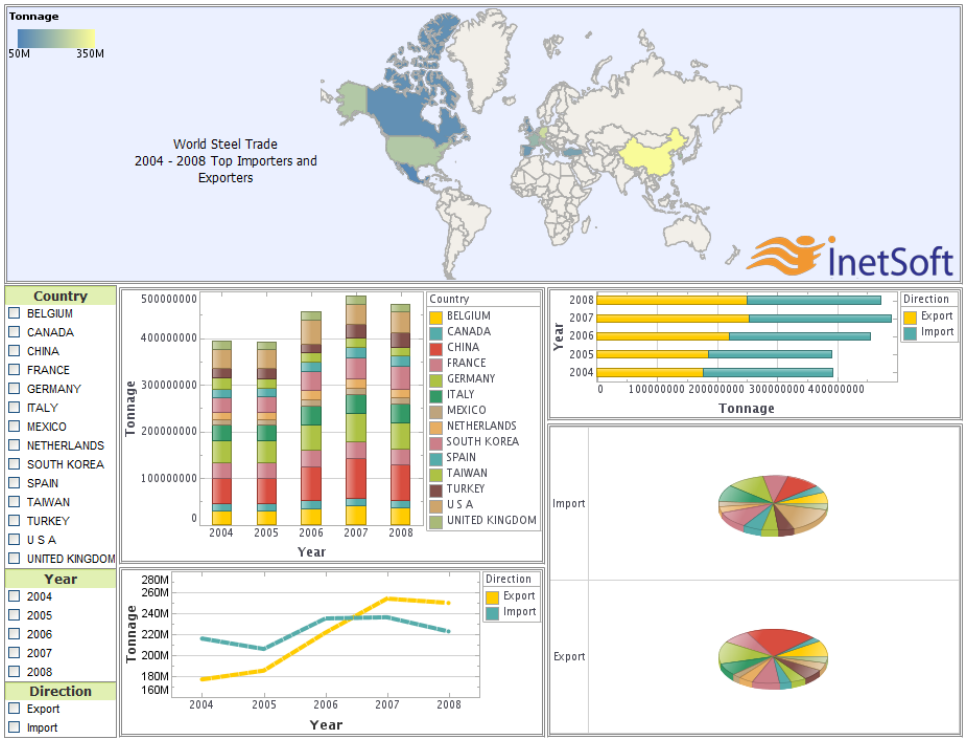

Figure 2.1 Desktop BI dashboard example

Since the field of BI hasn't been able to stay immune to the "mobility" changes, besides desktop dashboards nowadays users can access BI applications over smartphones and tablets. There are companies in the market that already employ mobile BI, and since some of our respondents work in those companies and use mobile BI on a daily basis, we will provide an example of BI application for tablets and smartphones. Tona and Carlsson (2013) stated how mobile BI has emerged into the subfield of BI, delivering information through these mobile devices. The example of the mobile BI application can be seen in the figure 2.2.

Figure 2.2 Mobile BI dashboard example

2.1.3. Motivation for choice of target technology

The success of the BI project reflects in the quality of the decisions users make based on the BI application. As previously mentioned, decision making was defined as critical in management activities back in 1947 by Herbert Simon, and given that the stakes are much higher today, the importance can only be higher. Furthermore, as it can be seen in the previous paragraph, if the implementation of the BI system is solid, users are the ones that play the critical role when it comes to the success of the system.

For that reasons, we want to explore different factors that positively affect the intention to use BI applications. Since Agarwal and Karahanna (2000) identified cognitive absorption (CA) as one of the critical constructs that influence, directly and indirectly, behavioral intention to use information technology (in their case Web), we will try to investigate whether CA is important in the BI applications context as well. Furthermore, we want to consider the effects of the CA on perceived usefulness and perceived ease of use of the BI application, and the influence of some of the users' individual characteristics (personal innovativeness and playfulness) on the CA with the BI application.

Additionally, user acceptance of the information technology is often investigated in the voluntary contexts. Agarwal and Karahanna (2000) used Web as a target technology, Lee (2010) dealt with social networking sites, Venkatesh, Thong and Xu (2012) with Internet. BI, on the other hand, is not a part of the voluntary context, it is a technology which is mandatorily used in the work environment for decision making. This is one more reason we have chosen BI as a target technology, since the users are spread across the different positions in one company and it affects the decision making in the whole organization. Our research thus aims to explore this less

researched context, investigating the effects of factors like CA when it comes to non-voluntary interaction with technology within an organizational setting. This way, our research will add to the existing knowledge in this topic as well as expand on it.

2.2. Technology acceptance model

Technology acceptance model (TAM) was introduced by Davis Jr (1986) for modeling how system characteristics influence user acceptance of information systems. The aim of the research was to improve understanding of user acceptance as well as to provide a theoretical basis for testing user acceptance (Davis Jr 1986). This type of testing is aimed to give useful information about whether the proposed system would be likely to succeed or not, in the early stages of its development (Davis Jr 1986).

TAM was based on theory of reasoned action (TRA) developed by Fishbein and Ajzen (1975). TRA is used for predicting and explaining human behavior for many domains, and is very general (Davis, Bagozzi and Warshaw 1989). TAM on the other hand is less general and uses TRA as a theoretical basis to specifically address user behavior when dealing with information systems (Davis et al. 1989). TAM attempted to trace the impact of external factors on internal beliefs, attitudes and intentions by identifying fundamental variables which influence technology acceptance and explore relationships between those variables (Davis et al. 1989). The model suggests that technology use intentions are primarily influenced by two determinants: *perceived usefulness* and *perceived ease of use* (Davis Jr 1986).

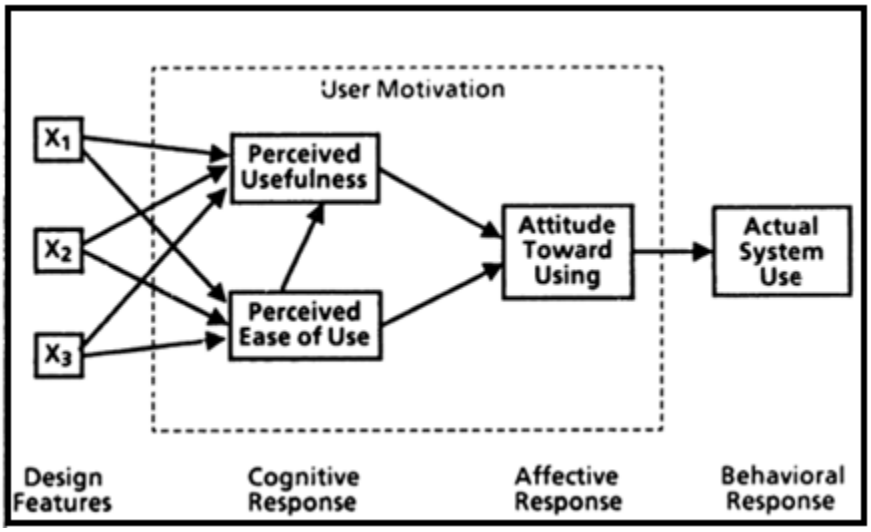

Figure 2.3 Technology Acceptance Model (Davis Jr 1986).

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320), while *perceived ease of use* is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320). Although the original formulation of TAM included attitude

as a construct mediating the effects of beliefs on intention, subsequently attitude was dropped from the specification of TAM (Davis et al. 1989).

Table 2.1Perceived Usefulness and Perceived Ease of Use definitions

Theoretical construct	Definition
Perceived usefulness	"The degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320)
Perceived ease of use	"The degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320)

Venkatesh and Davis (2000) developed an extension of TAM, referred to as TAM2, which explored user acceptance by adding additional theoretical constructs. They covered the social influence processes by adding variables such as subjective norm, voluntariness, and image (Venkatesh and Davis 2000). Additional variables relating to cognitive instrumental processes are job relevance, output quality, result demonstrability, and perceived ease of use (Venkatesh and Davis 2000). To expand TAM further, Venkatesh and Bala (2008) developed TAM3 to investigate possible crossover effects between perceived usefulness and perceived ease of use by developing an integrated model.

Despite these two extensions our study is using the original TAM model by Davis Jr (1986), since the theoretical model we are testing, by Agarwal and Karahanna (2000), includes the original TAM formulation with variables of perceived usefulness and perceived ease of use.

2.3. Cognitive absorption

In order to explain the cognitive absorption firstly we will provide the definition and some of the key research in the field. Secondly, we will explain Agarwal and Karahanna (2000) view on the cognitive absorption. The authors explained it by relating it to the three streams of the research, the personality trait of absorption, the state of flow and the notion of cognitive engagement. Furthermore, cognitive absorption is identified through five dimensions, temporal dissociation, focused immersion, heightened enjoyment, control and curiosity.

2.3.1. Definition and key research

Cognitive absorption (CA) can be defined as a motivating state of deep involvement with an information technology and it is derived from technology acceptance research, specifically Csikszentmihalyi's concept of flow and Webster and Hackley's concept of cognitive engagement (Leong 2011). CA has been mainly used to explore models of user behavior towards an information technology, i. e. user beliefs and behavioral intentions (Weniger and Loebbecke 2011a). Moreover, it is supposed to help improve the understanding of the formation of user

beliefs (Weniger and Loebbecke 2011b). On the other hand, CA can also be defined as a measurement used to evaluate a user's engagement with and information system during utilization (Burton-Jones and Straub Jr 2006).

Chandra, Srivastava and Theng (2012) summarized the key CA research in the IS/IT field. As it can be seen it the table, CA proved to be very important construct in many different situations and contexts. Burton-Jones and Straub Jr (2006) and Burton-Jones and Gallivan (2007) explored the effects of CA in system usage and offered new directions into the nature of system usage. Shang, Chen and Shen (2005) found CA to be very important in the understanding of online consumer behavior. Furthermore, Lin (2009) explored the effects of CA in the context of virtual communities; Park, Nah, DeWester, Eschenbrenner and Jeon (2008) investigated CA in a relation to the flow state in the context of brand equity; Saadé and Bahli (2005) defined CA as very important for acceptance of online learning systems. Finally, Whitten and Wakefield (2006) used CA in the combination with user playfulness in the context of IT outsourcing services and found that both constructs impact user beliefs. Summarized key research can be seen in the table 2.2 (Chandra et al. 2012).

Table 2.2 Key CA research (Chandra et al. 2012)

Paper	Results
Burton-Jones and Gallivan (2007)	System usage presented as a multilevel construct.
Burton-Jones and Straub Jr (2006)	Results suggest new directions for research into the nature of system usage, its antecedents, and its consequences.
Park et al. (2008)	The study proposes a model linking environment-induced and business-enabled affordances to enhance the flow state, which in turn increases customers' perceived brand equity.
Lin (2009)	Cognitive absorption significantly affects behavioral intention through perceived usefulness and perceived ease of use of the virtual community.
Saadé and Bahli (2005)	Results show the significance of cognitive absorption for acceptance of online learning systems.
Shang et al. (2005)	Results show that fashion and a cognitive absorption experiences on the web were more important than their extrinsic factors in explaining online consuming behavior.
Whitten and Wakefield (2006)	Cognitive absorption and user playfulness impact beliefs.

2.3.2. CA in Agarwal and Karahanna (2000)

Building on the prior work, CA is defined as a "state of deep involvement with software" (Agarwal and Karahanna 2000, p. 665). That involvement is, as authors explained it, identified through five dimensions:

- temporal dissociation
- focused immersion
- heightened enjoyment
- control
- curiosity

Temporal dissociation is defined as the inability to notice the flow of time while interacting with the information technology. Focused immersion is defined as a state where other factors that demand attention are ignored. The authors equalized the heightened enjoyment with the pleasure caused by the interaction, control as the possibility of being in charge and curiosity definition is taken from Malone (1982). The author defined curiosity as the extent to which the experience causes an individual's sensory and cognitive curiosity.

The theoretical background of cognitive absorption was explained by relating it to three streams of research (Agarwal and Karahanna 2000):

- the personality trait dimension of absorption
- the state of flow
- the notion of cognitive engagement

The trait of absorption

The authors defined the trait of absorption as a "state of deep attention and engagement" (Agarwal and Karahanna 2000, p. 667). CA was firstly conceptualized in Tellegen and Atkinson (1974). Those authors defined the term as "a disposition for having episodes of "total" attention that fully engage one's representational (i.e., perceptual, enactive, imaginative, and ideational) resources." (Tellegen and Atkinson 1974, p. 268). After the initial definition of the concept, Tellegen continued to develop it further. The author defined the absorption as a trait that describes individuals relatively stable. The result of that was Tellegen Absorption Scale (TAS) which consists of nine content concepts and was utilized in several additional studies which defined absorption as a key element that influences individual's total experience with an object (Dixon, Labelle and Laurence 1996):

- responsiveness to engaging stimuli
- responsiveness to inductive stimuli
- thinking in images
- ability to summon vivid and suggestive images
- tendency to have cross-modal experiences
- ability to become absorbed in one's own thoughts and imaginings

- tendency to have episodes of expanded awareness
- ability to experience altered states of consciousness
- ability to re-experience the past

As previously mentioned, Tellegen defined absorption as a trait, but there are other authors that stressed the difference between state and trait notion of absorption (Dixon et al. (1996); Kumar, Cummings and Pekala (1996)). Those authors are of the opinion that the trait of the absorption is an antecedent of the state of absorption.

The state of flow

Concept of flow is defined as "the state in which people are so involved in an activity that nothing else seems to matter" (Csíkszentmihályi 1990, p. 4). The author identified flow as a four dimensional concept. The dimensions of flow are intense concentration, a sense of being in control, a loss of self-consciousness and a transformation of time. Those dimensions affect an individual's attitude toward a certain technology. Wild, Kuiken and Schopflocher (1995) find the concepts of flow and CA to be conceptually similar.

Csíkszentmihályi's work was used as a foundation in Trevino and Webster (1992). The authors agree with Csíkszentmihályi (1990) that the flow is an important antecedent of attitudes toward technologies and define four dimensions of flow: (1) control dimension, (2) an attention focus, (3) curiosity dimension, (4) intrinsic interest dimension. Agarwal, Sambamurthy and Stair (1997) built upon the flow as defined by Trevino and Webster and defined new construct of CA which was defined as related to the individual behavior towards a new technology. The authors combined several dimensions:

- Trevino and Webster's four dimensions of flow
- computer playfulness from Webster and Martocchio (1992)
- ease of use from Davis (1989)

As a result of the empirical investigation, CA was defined as an important predictor of beliefs about usefulness.

Webster, Trevino and Ryan (1993) argued that the specific characteristics of the software technology and the use behaviors could affect the state of flow. The state of flow was explored by Ghani and Deshpande (1994) who defined two key characteristics of flow - total concentration in an activity and the enjoyment one derives from and activity.

The notion of cognitive engagement

Webster and Ho (1997) developed the concept of flow furthermore. They introduced a construct called cognitive engagement. Their construct excluded the control dimension from Trevino and Webster (1992) definition of flow and encompassed three other dimensions: intrinsic interest, curiosity and attention focus. Their argument was that the engagement is caused by the playfulness component which is identical to the flow experience.

Table 2.3 Theoretical background of CA summary

Concept	Dimensions	Definition
Trait of absorption	Control Attention focus Curiosity Intrinsic interest Computer playfulness Ease of use	"State of deep attention and engagement" (Agarwal and Karahanna 2000, p. 667)
The state of flow	Intense concentration Sense of being in control Loss of self-consciousness Transformation of time	"The state in which people are so involved in an activity that nothing else seems to matter" (Csíkszentmihályi 1990, p. 4)
Cognitive engagement	Intrinsic interest Curiosity Attention focus	The state of flow with the notion of control. (Webster and Ho 1997)

2.4. Theoretical model and hypotheses

In order to understand the role played by CA in users' reactions to information technology Agarwal and Karahanna (2000) placed it within the nomological net, and that theoretical model will be used in this paper for hypotheses testing.

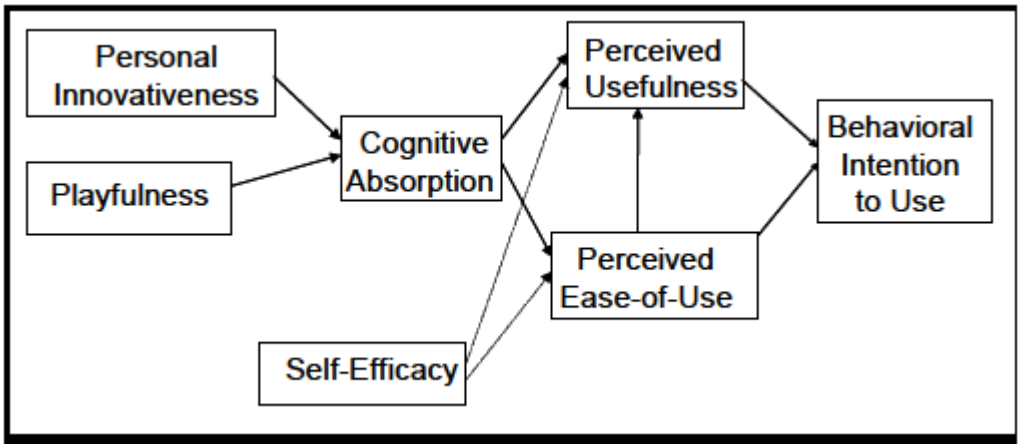

Figure 2.4 Theoretical model (Agarwal and Karahanna 2000)

In the next section, the theoretical arguments that support this theoretical model will be explained in order to understand the possible antecedents and consequences of CA.

2.4.1. Belief-attitude-behavior

As it can be concluded from the TAM explanation, the right side of the theoretical model is based on TAM components, where Davis et al. (1989) suggested that use intentions towards a technology are predicted by two concepts - perceived usefulness and perceived ease of use. Ease of use is defined by Agarwal and Karahanna (2000) as the extent that the individual finds a software artifact easy to interact with. Adams, Nelson and Todd (1992) argued that the individuals are more likely to use new technologies if they expect little effort to be needed for the interaction. Perceived usefulness, as the other component, is defined as the extent to which an individual believes that the interaction with the technology would enhance the job performance (Davis 1989). In relation to this, Agarwal and Karahanna (2000) are of the opinion that perceived usefulness influences technology utilization since the users believe in the existence of a "use-performance relationship".

Agarwal and Karahanna (2000) state how perceived ease of use influences usage behavior through two causal components:

- direct effect
- indirect effect through perceived usefulness

Drawing on the literature review presented above, we adapted the hypotheses presented in Agarwal and Karahanna (2000) in order to test them in the context of BI.

- H1: Perceived usefulness of a BI application has a positive effect on behavioral intention to use the BI application.
- H2: Perceived ease of use of a BI application has a positive effect on behavioral intention to use the BI application.
- H3: Perceived ease of use of a BI application has a positive effect perceived usefulness of the BI application.

2.4.2. Consequences of CA

Agarwal and Karahanna (2000) considered the fit between CA and constructs and relationships from TAM. The authors explained the positive influence CA is expected to have on ease of use through its five dimensions:

- Temporal dissociation: ease of use is influenced with the individual's perception about the time needed for task completion. The more time, the easier will the usage be.
- Focused immersion: the individual invests all of the attentional resources into the task, thus reducing the level of cognitive burden caused by the task, which results in growth of the level of perceived ease of use.
- Heightened enjoyment: the authors took Csíkszentmihályi (1990) notion of the enjoyment - enjoyable activities are perceived as less demanding
- Control: Being in charge should influence the perceived ease of use to be higher.

- Curiosity: Webster et al. (1993) suggested that the curiosity should invoke excitement about available possibilities. Excitement reduces the perceived cognitive burden connected to the interaction.

Furthermore in the process of establishing the relevance of CA as a predictor of perceived ease of use, Agarwal and Karahanna (2000) shifted attention to the concept of self-efficacy. The authors related to the prior work of Venkatesh and Davis (1996) which identified self-efficacy as a key determinant. Self-efficacy, as defined in Bandura (1997), is a confidence in an individual's ability to perform a task. Agarwal and Karahanna (2000) agreed with that definition but they also suggested that CA "is an additional salient influence". Based on that we adapted Agarwal and Karahanna (2000) hypothesis:

- H4: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived ease of use of the BI application.

In order to justify previous hypothesis, Agarwal and Karahanna (2000) related back to the Bem (1972) self-perception theory. Bem (1972) defined two postulates of self-perception theory which suggest that people seek rationalization for their attitudes by observing their own behavior. Festinger (1962) on the other hand, finds the rationalization of the actions as a tool for reducing cognitive dissonance. Related to Festinger's work, Agarwal and Karahanna defined cognitive dissonance as a psychological state that arises when "an individual holds two inconsistent cognitive structures at a same time." (Agarwal and Karahanna 2000, p. 670). Furthermore, the authors explained the relationship between CA and cognitive dissonance. CA as a state causes the individual to feel gratification and pleasure from the task (Agarwal and Karahanna 2000). The authors then argued that the majority of social environments identify instrumental outcomes as valuable, and that causes cognitive dissonance. Therefore, by adding the instrumental value, individual is likely to overlook the pleasurable aspects of an activity or to "account for the time spent on the activity" (Agarwal and Karahanna 2000, p. 676). The conclusion the authors made is that a state of CA can, through the heightened enjoyment dimension, positively influence perceived usefulness.

Agarwal and Karahanna (2000) related back to the Compeau and Higgins (1995), Compeau, Higgins and Huff (1999) who used Bandura (1997) social cognitive theory to define the relationship between self-efficacy and an individual's expectations about the consequences of performing a specific behavior - self-efficacy would have a positive influence on those expectations. This analysis is used as a base for the next hypothesis, adapted from Agarwal and Karahanna (2000), that tests CA as an additional predictor of perceived usefulness:

- H5: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived usefulness of the BI application.

2.4.3. Prediction of the state of CA

After analyzing the antecedents and consequences of CA, we will present the possible predictions of the state of CA. Agarwal and Karahanna (2000) expected that playfulness was one of the predictors of CA. Their expectation is based on the fact that the state of CA includes at least three dimensions of flow that Webster and Martocchio (1992) defined. Apart from playfulness, the authors theorized that another predictor of CA in the field of information technology is personal innovativeness, which was defined by Agarwal and Prasad (1998). Personal innovativeness is defined as "an individual trait reflecting a willingness to try out any new technology" (Agarwal and Karahanna 2000, p. 677). Based on this, the authors argued that the individuals who are more innovative with the computers are more likely to be predisposed to CA. In order to test their claim, we adapted the next hypotheses to the context of BI:

- H6: Computer playfulness has a positive effect on cognitive absorption with a BI application.
- H7: Personal innovativeness has a positive effect on cognitive absorption with a BI application

The authors' final expectation is that CA has the most important role in understanding of users and their behaviors toward information technology. That role is based on the fact that CA affects users' beliefs about the technology. Through our research, we will explore whether this expectation of CA having the most important role hold true when it comes to interaction with BI technologies.

The figure 2.5 shows all the hypotheses we are testing in the theoretical model.

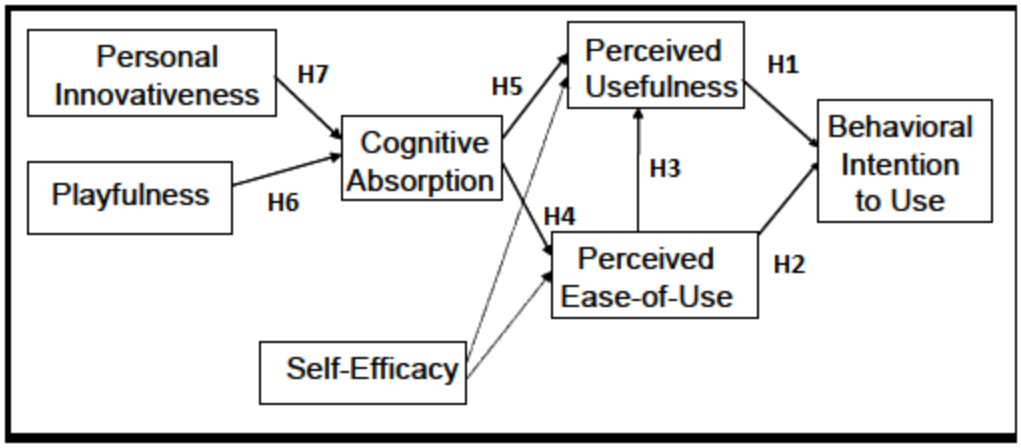

Figure 2.5 Theoretical model and the hypotheses

3. Methodology

This section will concentrate on the research method used to conduct the study. We will motivate the choice of the exploratory study and survey as a research method. Since the survey was performed via questionnaire, we will go into detail on the data collection technique, the development of the questionnaire and the measurement items used to measure the constructs. After explaining the data collection, we will provide the description of the target population and the procedure followed to contact the respondents. The last part of the methodology section will clarify the research quality and ethics method used in this study.

3.1. Research method

Depending on its purpose, a research project is generally classified as exploratory, descriptive and explanatory (Bhattacherjee 2012). Explanatory research is used for hypotheses testing and usually measures relationships between variables by using statistical techniques (Given 2008). Bhattacherjee (2012) also states how it aims to explain the phenomena of interest, problems and behaviors. As the goal of this study is to explore behavior toward BI and identify causal relationships between different constructs of interest through hypotheses testing, explanatory research is the most appropriate type.

Besides the research type, a researcher also must decide on a research method to be used for collecting data in order to answer the research question (Bhattacherjee 2012). When it comes to quantitative research one of the popular methods is survey, where a survey research of explanatory type is used to ask about relations between variables which are grounded in theory (Recker 2013). Based on this definition on explanatory survey, this particular method can help us in our purpose of theory testing and investigation of the causal relations between theoretical constructs, where the theoretical constructs that are examined are:

- personal innovativeness
- playfulness
- cognitive absorption
- self-efficacy
- perceived usefulness
- perceived ease-of-use
- behavioral intention to use

Recker (2013) also states how the theory behind survey research includes some causality elements of the relationships between theoretical constructs, as well as the directionality of those relationships. It can be seen from our research model that the before mentioned constructs are connected in a causal way with the predefined direction of relationships.

Therefore, from all of these arguments it is concluded how the survey method of explanatory type is the most appropriate for our study purpose and chosen phenomena of the interest.

3.2. Survey method

This part of the paper will address the development of the questionnaire. We will present the variables used in the theoretical model (Figure 2.6.) and discuss their origins. Since all of variables are adapted from previous research we will explain the theory behind them and measurement items adapted to fit the BI context.

3.2.1. Development of questions

The research variables used are:

- Perceived usefulness: adapted from Davis (1989)
- Ease of use: adapted from Davis (1989)
- Behavioral intention: from Ajzen and Fishbein (1980)
- Self-efficacy: from Compeau and Higgins (1995)
- Personal innovativeness: from Agarwal and Prasad (1998)
- Cognitive playfulness: from Webster and Martocchio (1992)
- Cognitive absorption: from Agarwal and Karahanna (2000)

Perceived usefulness and ease of use have been defined by Davis (1989) as a way of predicting user acceptance of computers. Davis (1989) describes *perceived usefulness* as the degree to which a person believes that using a particular system would enhance his or her job performance, and *perceived ease of use* as the degree to which a person believes that using a particular system would be free of effort. His research resulted with 6 scale items for each variable, which were later pretested and validated in two separate empirical studies. The theoretical foundations for these two variables are supported by theories such as expectancy theory, self-efficacy theory, behavioral-decision theory, a cost-benefit paradigm, and adoption of innovations research (Davis et al. 1989). Both perceived usefulness and ease of use are presented in our theoretical model (figure 2.6) with multi item scales adapted from Davis (1989) used to examine user acceptance of BI.

Behavioral intention was adapted from Ajzen and Fishbein (1980). These authors proposed the theory of reasoned action (TRA), which derived from social psychology and states how behavior is determined by the behavioral intention to engage in that behavior (Ajzen and Fishbein 1980). The behavioral intention in turn depends on the attitude about that behavior and the subjective norm, or the opinions of one's social environment (Ajzen and Fishbein 1980). The survey uses behavioral intention variable to examine users' motivation and future intentions of continuing the BI use.

Self-efficacy, or the belief one has the capability to perform a particular behavior, was assessed using the scale developed by Compeau and Higgins (1995). They developed a measure for computer self-efficacy as well as performed a test of the reliability and validity of the measure (Compeau and Higgins 1995). It is used to understand what the impact of this belief in the decision to use BI is.

Personal innovativeness was measured using the scale proposed by Agarwal and Prasad (1998). The understanding of this construct helps in identifying those individuals which are more likely to adopt information technology innovations earlier than others (Agarwal and Prasad 1998). It includes exploring personal characteristics in the adoptions of new technology, differently from most others which focus on how the intention for that adoption is created (Agarwal and Prasad 1998).

Cognitive playfulness used the scale from Webster and Martocchio (1992). Their research focused on microcomputer playfulness, defining this as "the degree of cognitive spontaneity in microcomputer interactions" (Webster and Martocchio 1992, p. 201). The authors concluded how further research should focus more on positive influences such as playfulness in human-computer interaction(Webster and Martocchio 1992). Cognitive playfulness acts as an intrinsic motivation variable, examining the importance of this factor with regard to BI.

The final variable - cognitive absorption was adapted from Agarwal and Karahanna (2000) who defined it as a state of deep involvement with software, being exhibited through five dimensions of temporal dissociation, focused immersion, heightened enjoyment, control, and curiosity. The authors developed measures for each dimension:

- five items capturing temporal dissociation
- five items measuring focused immersion
- four statements measuring heightened enjoyment (based on Davis, Bagozzi and Warshaw (1992) perceived enjoyment items, Webster et al. (1993) intrinsic interest items, and some new items defined by Agarwal and Karahanna (2000))
- three items measuring control from Webster et al. (1993)
- three items measuring curiosity from Webster et al. (1993)

All of the five dimensions with their respectable measure items were adapted for use in our survey.

3.2.2. Measurement items

Table 3.1 shows the items used in order to measure each of the constructs:

Table 3.1 Measurement items

Construct	Measurement items
Temporal Dissociation (TD)	TD1 - Time appears to go by very quickly when I am using BI application. TD2 - Sometimes I lose track of time when I am using BI application. TD3 - Time flies when I am using BI application. TD4 - Most times when I use BI application, I end up spending more time that I had planned.

	TD5 - I often spend more time using BI application than I had intended.
Focused Immersion (FI)	FI1 - While using BI application I am able to block out most other distractions. FI2 - While using BI application, I am absorbed in what I am doing. FI3 - While I am using BI application, I am immersed in the task I am performing. FI4 - When I am using BI application, I get distracted by other attentions very easily. FI5 - While I am using BI application, my attention does not get diverted very easily.
Heightened Enjoyment (HE)	HE1 - I have fun interacting with BI application. HE2 - Using BI application provides me with a lot of enjoyment. HE3 - I enjoy using BI application. HE4 - Using BI application bores me.
CO = Control (CO)	CO1 - When using BI application I feel in control. CO2 - I feel that I have no control over my interaction with BI application. CO3 - BI application allows me to control my interactions with the software.
Curiosity (CU)	CU1 - Using BI application excites my curiosity. CU2 - Interacting with BI application makes me curious. CU3 - Using BI application arouses my imagination.
Personal Innovativeness (PIIT)	PIIT1 - If I heard about a new information technology, I would look for ways to experiment with it. PIIT2 - In general, I am hesitant to try out new information technologies. PIIT3 - Among my colleagues, I am usually the first to try out new information technologies. PIIT4 - I like to experiment with new information technologies.
Playfulness (CPS)	PS1 - When using BI application I am spontaneous. PS2 - When using BI application I am imaginative. PS3 - When using BI application I am flexible. PS4 - When using BI application I am creative. PS5 - When using BI application I am playful. PS6 - When using BI application I am original. PS7 - When using BI application I am inventive.
Perceived Usefulness (PU)	PU1 - Using BI application enhances my effectiveness at work. PU2 - Using BI application enhances my productivity.

	PU3 - I find BI application useful in my work activities.
Perceived Ease of Use (PEOU)	PEOU1 - Learning to operate a BI application is easy for me. PEOU2 - I find it easy to get the BI application to do what I want it to do. PEOU3 - It is easy for me to become skillful at using the BI application. PEOU4 - I find the BI application easy to use.
Behavioral Intention (BI)	BI1 - I plan to use BI application in the future. BI2 - I intend to continue using BI application in the future. BI3 - I expect my use of BI application to continue in the future.
Self-Efficacy (SE)	I could complete the job using the software package... SE1 - if there was no one around to tell me what to do as I go. SE2 - if I had never used a package like it before. SE3 - if I had only the software manuals for reference. SE4 - if I had seen someone else using it before trying it myself. SE5 - if I could call someone for help if I got stuck. SE6 - if someone else had helped me get started. SE7 - if I had a lot of time to complete the job for which the software was provided. SE8 - if I had just the built-in help facility for assistance. SE9 - if someone showed me how to do it first. SE10 - if I had used similar packages like this one before to do the job.

All variables except Self Efficacy are measured as seven-point scales with the anchors:

- 1 = Strongly disagree
- 4 = Neutral
- 7 = Strongly agree

Self-Efficacy is a 10-point scale with anchors:

- 1 = Not at all confident
- 10 = Very confident

3.3. Data collection

The data about users' perceptions on using BI applications was collected quantitatively, through the use of a questionnaire-based survey. The questionnaire technique was chosen in order to increase reliability of results. As Recker (2013) states, reliability problems often come from being dependent on subjective observations, which is why quantitative research often uses questionnaires as a more objective technique. Additionally, questionnaire provides several advantages which were crucial to our research. Some of these advantages are described by Recker (2013), such as:

- being easy and cheap to administer to a large population
- determine the relations of variables and constructs
- can be used to predict behavior
- provide objective way to test theoretical propositions

There are also some disadvantages with questionnaires, such as high possibility of low response rates. Despite this risk, the questionnaire technique was the most suitable choice for the purposes of our research. The designed questionnaire consists both of open ended and closed questions. Open ended questions were used to collect data about the respondents. As Bhattacherjee (2012) stated, even the highly structured questionnaire, as the one used in this study, can still include some open ended questions which are used to collect data which can provide unexpected insights. Closed questions are used to test the proposed research model and its theoretical constructs' relationships.

3.3.1. Target population

In order to select participants for our target population, a convenience sampling technique was used. This type of sampling includes selecting those cases that are easiest to obtain where the selection process is continued until the defined sample size has been reached, however there are no clear requirements for the sample size (Saunders, Saunders, Lewis and Thornhill 2011).

We limited the selection of participants based on the choice of the technology in this study. As the chosen technology is BI, our target population are employees of companies that use different BI application, or more specifically BI end users, where a BI end-user can be defined as a person with or without technical skills operating at any level within the company, using any BI application through a desktop, tablet or smartphone device, who is acting as a decision maker and using information gained from the BI application in the decision making process.

To achieve good reliability of the study, these users are required to have suitable experience with using a BI application in order to be qualified to answer all of the questions. This way, we avoid reliability problems as described by Recker (2013), where users are unfamiliar with the technology in question or are asked a question they are unqualified to answer.

3.3.2. Administration of questionnaire

Both mail questionnaire and online questionnaire techniques were employed in our study. The companies were firstly contacted by sending out direct emails explaining the purpose of the study and containing a link to the questionnaire. Additionally, we took advantage of online communities such as LinkedIn where we contacted employees through a direct message as well as posted the survey in groups such as:

- Business Intelligence Tools
- DW, BI & PM Professionals - Adriatics
- Business Intelligence, Big Data, Analytics, MIS Reporting & Database Group
- Microsoft Business Intelligence

The survey was also posted on online forums such as http://www.sqlservercentral.com/. In total over 250 direct emails were sent out to companies accompanied with posting on online communities such as LinkedIn and forums, resulting in a final respondent number of 77. The low response rate results from limitations in time and access to organizations. The questionnaire was designed using Google Docs, which allows sharing link to the questionnaire and automatically records all responses in a spreadsheet, including information on exact time and date of the response. The final questionnaire, as presented to the respondents, can be seen in Appendix 1.

3.4. Research quality and ethics

In the following sub-sections we describe the concepts taken in consideration in order to ensure the highest possible quality of our study. These concepts of generalizability, validity and reliability, as attributes which can be used to define the quality of a research are discussed. Additionally, we address the ethical aspects which had to be considered while conducting this research.

Recker (2013) states how reliability implies that the operations of a study can be repeated in equal settings with the same results. We have tried to achieve reliability in our study by providing as detailed descriptions as possible of the entire process, from the theoretical background, questionnaire design, selection of participants, analysis process and reporting of results. The participants were selected to be end users with diverse experience with BI applications working in different fields, in order to ensure that the respondents are qualified to answer the questions and are familiar with the technology.

Wright (2005) discusses some of the problems associated with online surveys, which we used in our study, such as sampling issues, generating samples from virtual groups and organizations or online communities and similar sampling concerns. The author states how little may be known about the characteristics of people in online communities where there is no guarantee that participants participating in online surveys will provide accurate demographic or characteristics information (Wright 2005). Our study took advantage of online communities such as LinkedIn and various technical forums for the data gathering process, which may be considered as a

concern to reliability of the gathered data. However, some of the data was also collected through direct contact with employees and organizations either through sending out emails or direct contact through LinkedIn. In order to ensure the reliability of the entire dataset, we compared the answered from both of these groups, those collected individually and over online communities. The results showed that there were no significant differences among these two subsets of data, thus not influencing its reliability.

Furthermore, by providing detailed explanations of the terms used in questionnaire to the respondents, we avoided possible misunderstandings about the definitions and ensured the quality of the responses.

Additionally, all of the responses to the questionnaire were automatically recorded through Google Docs, including information on exact time and date of the response being recorded. The questions were designed in such a way not to confuse the respondent or try to push the answers in a certain direction where the concept and aim of the research was clearly communicated to all of the participants. In order to ensure reliability of measurement scales used, several statistical tests were employed.

3.4.1. Validity

According to Recker (2013) validity describes whether the data collected really measures what the researcher set out to measure. One of the theoretical models used as a basis for our study and the developed scale measures was TAM, a widely recognized framework used by many researches over the years. The reliability and validity of the measurement scales used with TAM has been tested by Davis (1989) and replicated and tested in other contexts by other researchers such as Adams et al. (1992) and Hendrickson, Massey and Cronan (1993) Others have also used the work by Agarwal and Karahanna (2000), which is the main paper used for our research, adapting and testing the constructs these authors used such as the concept of flow, cognitive absorption, enjoyment etc. The studies ranged from exploring users' acceptance of online games, predicting the use of web-based information systems, examining the adoption of mobile internet or exploring the factors which affect users joining social networking sites. The fact that these theoretical models which we used for the development of our final questionnaire have been previously thoroughly tested with their validity proved provides good evidence that the data collected from our questionnaire indeed answers those questions we have set out to find answers to. We also additionally tested the validity of measurement scales according to our data.

Furthermore, the statistical method we used for analyzing our empirical data, PLS, provides advantages which enhance the validity of the study we conducted. Despite the smaller sample size in our research, one advantage of PLS is that it has minimal demands when it comes to the sample size, where this factor is not of a big importance when performing calculations with PLS. This characteristic of PLS provides greater validity and generalizability of our findings.

3.4.2. Generalizability

Generalizability or external validity refers to whether the observed associations can be generalized from the sample used to the population or to other people, organizations, contexts, or time (Bhattacherjee 2012). The study we conducted was focused purely on one technology, BI, with the setting for the study being organizations employing this technology and respondents being the end users of the technology inside those organizations. Because of this, we cannot ensure the generalizability of our findings on other technologies. However, since the study focused on a technology used in an organizational office setting, the findings may generalize to other similarly used technologies. The fact that we used an online questionnaire gave us the possibility for the results not to be focused on a particular country, enhancing the generalizability of the study. In order to enhance the transferability of our findings we provide a detailed description of steps taken for the collection and analysis of empirical data. Additionally, the theoretical constructs used in the design of our questionnaire are thoroughly described, and the final questionnaire design is provided in the appendix.

3.4.3. Ethics

When conducting research, there are always some ethical issues which need to be considered. Bhattacherjee (2012) states there are some general rules or guidelines which need to be followed by researchers, such as not manipulating data or results in any way in order to achieve our personal goals. In order to fulfill the criteria for ethics in scientific research described by Bhattacherjee (2012) we made sure that the respondents in the survey were aware that their participation is on voluntary basis, as well as the fact that their responses are confidential. When contacting organizations and individuals by email or posting the survey on online communities we made sure to communicate the purpose and goals of our research, in order to give the participants some general information about the study before their decision to participate. The purpose of this is to assure the participants are aware of the purpose of the study, the key terms used, intended use of data and the confidentiality of their responses.

Finally, to ensure honest reporting we tried to make our research process as transparent as possible by describing in detail all of the steps taken, from the data collection, analysis and reporting of the results as well as proving the full questionnaire in the appendix.

4. Data analysis and results

In this section we will explain the statistical procedures used to analyze the data. Firstly, we will explain the data preparation performed in order to be able to analyze the data. Secondly, since the measurement items had to be assessed in order to confirm their reliability and validity, we will present the methods used for that purpose and the results. The final part of the section focuses on descriptive and inferential statistics which have helped us to test our hypotheses. The results of the performed analyses are explained in the textual parts and illustrated via tables and figures.

4.1. Preparation of the collected data

Data should be prepared following several processes, namely data coding (the process of converting the data into numeric format), data entry (coded data should be entered into, for example, spreadsheet), missing values (for example, some programs calculate the estimations of the missing values and use those estimations in analysis), data transformation (sometimes it is necessary to transform data so that it can be meaningfully interpreted) (Bhattacherjee 2012).

As previously mentioned the questionnaire used in this study was forwarded to the respondents via email and created using Google Docs. Google Docs provides the researchers with the certain level of automation, as all of the answers are automatically written down in the spreadsheet which can be downloaded and analyzed. Consequently, data preparation phase in this case proved to be very simple:

- data coding: while creating the questionnaire in the Google Docs, it is possible to put some restrictions on the field for answers. The authors restricted those fields as numeric values, and as a result, all of the data collected was in the numeric format (except from the 4 open ended questions which were not analyzed in the same way as the rest of the closed questions)
- data entry: this phase was performed automatically by Google Docs, as previously mentioned
- missing values: all of the questions in the questionnaire were obligatory, so there weren't missing values
- data transformation: there were some format inconsistencies with the data collected by open ended questions, hence those data was transformed into the same format (some respondents wrote numbers and others words as answers to the question where they were supposed to specify the duration of their experience with the BI application)

4.2. Measurement assessment

Henseler, Ringle and Sinkovics (2009) state how reflective measurement models should be assessed in connection to their validity and reliability, therefore before performing data analysis we will first test the reliability and validity of our measurement scales. First, we tested internal consistency by calculating Cronbach's alpha and composite reliability scores. Second, we evaluated the convergent validity by comparing AVE and composite reliability scores. Finally, we assessed the discriminant validity by examining loadings and cross loadings from the confirmatory factor analysis and by comparing the square root of AVE with the correlations among the latent variables.

4.2.1. Internal consistency

Internal consistency is the first step which needs to be checked (Henseler et al. 2009). To determine the internal consistency we will first check Cronbach's alpha value (Cronbach 1951).

Cronbach's Alpha test is widely used to evaluate the consistency of questionnaire respondents (Mitchell and Jolley 2012), and it provides an estimate for reliability based on indicator correlations (Henseler et al. 2009). According to Mitchell and Jolley (2012), alpha coefficient values larger than 0.70 are considered acceptable. Cronbach's alpha reliability coefficient normally ranges between 0 and 1, but there is actually no lower limit according Gliem and Gliem (2003). The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale (Gliem and Gliem 2003). In figure 4.1 we can see the results of Cronbach's alpha after running the analysis in SPSS. As seen from the figure, the total value is 0.954, showing very good measurement reliability.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.954	.961	51

Figure 4.1 SPSS Reliability statistics

In Table 4.1 below we can see the Cronbach's Alpha result for each construct. Again, the values are high, showing that the constructs within the model are well explained by the items in the questionnaire.

Table 4.1 Cronbach's Alpha and Composite Reliability scores

	AVE	Composite Reliability	Cronbach's Alpha
Behavioral intention to use	0.8366	0.9389	0.9021
Control	0.8317	0.9081	0.7982
Curiosity	0.7719	0.9103	0.8528
Focused immersion	0.7201	0.9112	0.8696
Heightened enjoyment	0.9028	0.9653	0.946
Perceived ease of use	0.848	0.9571	0.9404
Personal innovativeness	0.7294	0.8898	0.8185
Playfulness	0.7016	0.9427	0.929
Perceived usefulness	0.8941	0.962	0.9408
Self-efficacy	0.5233	0.9072	0.8866
Temporal dissociation	0.6135	0.8865	0.8543
Criteria	>0.5	>0.7	>0.7

However, we also must look at other important results related to Cronbach's Alpha, such as *Corrected Item-Total Correlation* and *Alpha if Item Deleted*. These results can be seen in Figure 4.2.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TD1	275.82	2324.019	.619	.798	.953
TD2	276.10	2328.542	.598	.936	.953
TD3	276.05	2316.366	.725	.946	.953
TD4	275.77	2372.971	.315	.947	.954
TD5	275.88	2370.447	.336	.948	.954
FI1	276.16	2322.528	.588	.906	.953
FI2	275.51	2320.122	.721	.923	.953
FI3	275.51	2308.832	.788	.934	.952
FI4	277.43	2425.748	-.035	.840	.955
FI5	276.23	2328.550	.595	.820	.953
HE1	275.55	2303.699	.713	.953	.953
HE2	275.55	2296.725	.739	.951	.952
HE3	275.26	2316.958	.711	.963	.953
HE4	278.22	2489.411	-.431	.922	.957
CO1	275.43	2324.380	.746	.904	.953
CO2	278.30	2441.370	-.134	.799	.956
CO3	275.74	2329.247	.693	.880	.953
PIIT1	274.90	2374.726	.473	.902	.954
PIIT2	278.44	2415.013	.033	.802	.956
PIIT3	275.40	2373.586	.336	.887	.954
PIIT4	274.79	2376.588	.425	.874	.954
SE1	272.94	2339.219	.338	.887	.955

Figure 4.2 SPSS internal consistency reliability if deleted

TD = Temporal Dissociation; FI = Focused Immersion; HE = Heightened Enjoyment; CO = Control; CU = Curiosity; PIIT = Personal Innovativeness, CPS = Playfulness, PU = Perceived Usefulness; PEOU = Perceived Ease of Use; BI = Behavioral Intention;

Corrected Item-Total Correlation represents correlation of the item with the summated score for all other items, where the value should be at least .40 (Gliem and Gliem 2003).

Cronbach's Alpha if Item Deleted value represents the Cronbach's alpha reliability coefficient if that item is removed from the scale (Gliem and Gliem 2003). If this value is greater than total Alpha coefficient value, this item might need to be removed from the scale to result in greater reliability (Gliem and Gliem 2003).

As can be seen from Figure 4.2 items FI4, HE4, CO2, PIIT2 and SE1 have low *Corrected Item-Total Correlation* values, as well as a higher *Cronbach's Alpha if Item Deleted* values than the total Alpha value (total value can be seen in Figure 4.1). Because of this reason, we might consider removing these five items before the final analysis, to benefit from higher measurement

reliability. Other tests will be performed to confirm these results before the final decision of whether to remove these items is made.

Henseler et al. (2009) state how Cronbach's Alpha can underestimate internal consistency reliability of latent variables in PLS (Partial least squares) path models, which is why a measure such as Composite reliability could be more appropriate. Since we are using PLS analysis we also used Composite reliability measure to check internal consistency, and the results can be seen in Table 4.1. A value above 0.8 or 0.9 is considered as satisfactory, while a value under 0.6. shows a lack of reliability (Henseler et al. 2009).

4.2.2. Convergent validity

For the assessment of validity, two validity subtypes are usually examined: the convergent validity and the discriminant validity (Henseler et al. 2009). Convergent validity shows that a set of indicators represents the same underlying construct (Henseler et al. 2009). In order to assess this validity subtype we used Average Variance Extracted (AVE), as suggested by Fornell and Larcker (1981), where an AVE value of at least 0.5 indicates sufficient convergent validity (Götz, Liehr-Gobbers and Krafft 2010). The values for Average Variance Extracted (AVE) can be seen in Table 4.1. All of the values are greater than the suggested value of 0.5, showing that each item has sufficient convergent validity. AVE stands for average variance extracted and it is a measure of convergent validity together with composite reliability (CR) value. In order to provide convergent validity, AVE should be 0.5 or more and CR 0.7 or more. Furthermore, CR should be higher than AVE.

4.2.3. Discriminant validity

For discriminant validity, as the other validity subtype, Agarwal and Karahanna (2000) used Chin and Newsted (1999) recommendations in assessing discriminant validity. The first step is to prove that indicators load more strongly on their corresponding construct than on other constructs and the second step involves comparing AVE value to inter-construct correlations, where square root of AVE should be larger than inter-construct correlations (Chin and Newsted 1999). The second step means that "the average variance shared between the construct and its indicators should be larger than the variance shared between the construct and other constructs" (Agarwal and Karahanna 2000, p. 679)

Confirmatory factor analysis

Confirmatory factor analysis is used to assess item loadings and cross loadings. Since cognitive absorption is treated as second order construct in the theoretical model, the special procedure had to be followed. Wilson and Henseler (2007) identified the two step approach for this purposes, and that procedure was used in Agarwal and Karahanna (2000). As the purpose of this paper is theory testing, the same procedure has been chosen. First, PLS analysis was performed without second-order constructs, and the latent variable scores from this step were used in the following

calculations. Latent variable scores were furthermore used as inputs in the separate model, which contained the second order constructs, and the CFA was performed on this model. The results of the CFA can be seen in the table 4.2.

Table 4.2 Confirmatory factor analysis results

	BI	CO	CU	FI	HE	PE	PIIT	PS	PU	SE	TD
BI1	0.8949	0.6864	0.5942	0.4898	0.4268	0.5518	0.2473	0.6016	0.672	0.3455	0.3053
BI2	0.9473	0.6791	0.6776	0.5516	0.6349	0.6097	0.3512	0.6711	0.7399	0.45	0.4569
BI3	0.9009	0.6248	0.6009	0.5135	0.5261	0.4877	0.3688	0.538	0.6963	0.5884	0.4482
CO1	0.6679	0.922	0.6481	0.6864	0.5877	0.6072	0.3252	0.6108	0.7077	0.5827	0.5391
CO3	0.6547	0.9018	0.6469	0.5306	0.5528	0.5551	0.3984	0.6002	0.632	0.5031	0.4528
CU1	0.5442	0.5374	0.8907	0.3278	0.5945	0.3593	0.5367	0.6044	0.555	0.3327	0.3427
CU2	0.6389	0.6408	0.8847	0.5289	0.7629	0.4578	0.3999	0.6509	0.6898	0.3839	0.5311
CU3	0.6064	0.6776	0.8601	0.4448	0.6148	0.4447	0.5084	0.6512	0.6321	0.4868	0.5506
FI1	0.4505	0.5916	0.3596	0.8048	0.3875	0.4846	0.2029	0.4575	0.4869	0.4529	0.4687
FI2	0.4997	0.5607	0.4357	0.9003	0.607	0.6705	0.191	0.5991	0.643	0.5998	0.5588
FI3	0.5465	0.6547	0.4858	0.8878	0.5995	0.5823	0.2785	0.6165	0.6389	0.706	0.5956
FI5	0.4195	0.4673	0.418	0.7961	0.528	0.4975	0.2595	0.5686	0.5072	0.4229	0.4779
HE1	0.5379	0.6048	0.7382	0.583	0.9479	0.5929	0.285	0.7575	0.6187	0.5024	0.4616
HE2	0.5405	0.5944	0.7277	0.6075	0.9682	0.5945	0.2566	0.7784	0.5957	0.5363	0.4822
HE3	0.5807	0.5852	0.6886	0.61	0.9341	0.6251	0.2586	0.7158	0.6532	0.5132	0.4645
PE1	0.4696	0.4362	0.3268	0.5124	0.5082	0.893	0.3071	0.6218	0.5332	0.3416	0.1942
PE2	0.634	0.6497	0.5162	0.64	0.647	0.9327	0.3335	0.7361	0.6901	0.58	0.3185
PE3	0.5682	0.6143	0.4513	0.6412	0.5929	0.9512	0.3664	0.7213	0.6783	0.5519	0.3418
PE4	0.5265	0.6196	0.4608	0.6298	0.5769	0.9055	0.3343	0.6172	0.6499	0.5554	0.3735
PIIT1	0.3407	0.4196	0.5548	0.2465	0.2918	0.3426	0.8483	0.3337	0.4312	0.3957	0.2776
PIIT3	0.2112	0.2194	0.355	0.2213	0.1659	0.215	0.8149	0.371	0.2334	0.1736	0.2171
PIIT4	0.3279	0.3303	0.4401	0.2319	0.2359	0.3528	0.8969	0.4185	0.3474	0.2438	0.2551
PS1	0.5329	0.5585	0.5885	0.5482	0.6839	0.6384	0.3527	0.8365	0.4349	0.3832	0.4038
PS2	0.6676	0.6769	0.7483	0.5257	0.6582	0.6169	0.3821	0.8289	0.5929	0.456	0.4984
PS3	0.5593	0.6109	0.5865	0.6408	0.6875	0.729	0.4303	0.8817	0.6081	0.509	0.4275
PS4	0.6159	0.5367	0.6288	0.6216	0.6678	0.592	0.359	0.8511	0.6599	0.5171	0.5073
PS5	0.4401	0.4814	0.5227	0.5341	0.6821	0.6539	0.2917	0.8494	0.4093	0.3781	0.3425
PS6	0.3933	0.3709	0.519	0.4542	0.6237	0.4665	0.3135	0.786	0.3564	0.3278	0.3342
PS7	0.6238	0.6122	0.6352	0.5486	0.6295	0.5932	0.401	0.8267	0.6452	0.5127	0.485
PU1	0.7727	0.7515	0.7037	0.6588	0.6229	0.6455	0.398	0.5836	0.9568	0.5784	0.5289
PU2	0.6686	0.669	0.676	0.6609	0.6886	0.7447	0.3458	0.6717	0.9376	0.5159	0.4338
PU3	0.7385	0.6657	0.6577	0.5966	0.5452	0.5915	0.4217	0.5644	0.9422	0.4775	0.4947
SE10	0.3409	0.3502	0.2981	0.3762	0.2857	0.2765	0.1701	0.281	0.3653	0.7443	0.492

SE2	0.1934	0.335	0.1545	0.4585	0.2253	0.3216	0.2706	0.3703	0.1648	0.6016	0.2993
SE3	0.3506	0.4155	0.2812	0.4714	0.2527	0.3002	0.2072	0.2792	0.434	0.6986	0.4847
SE4	0.3821	0.5213	0.3927	0.3793	0.4256	0.4625	0.2525	0.3361	0.4482	0.7725	0.4517
SE5	0.2755	0.3436	0.1823	0.4431	0.3798	0.4649	0.2796	0.4153	0.4002	0.6749	0.5029
SE6	0.5615	0.6649	0.5266	0.5654	0.5816	0.5933	0.3776	0.5665	0.583	0.8672	0.555
SE7	0.3338	0.3968	0.3817	0.5213	0.3859	0.2981	0.2087	0.3249	0.3282	0.7445	0.4977
SE8	0.4478	0.4443	0.4159	0.589	0.5323	0.4797	0.1948	0.4665	0.4431	0.7291	0.4208
SE9	0.2138	0.221	0.1825	0.4417	0.2766	0.2551	0.1467	0.3044	0.232	0.6444	0.3791
TD1	0.4829	0.5259	0.5339	0.5888	0.5119	0.3514	0.2655	0.4339	0.5276	0.519	0.8199
TD2	0.328	0.4437	0.4518	0.5436	0.4117	0.2619	0.2612	0.5022	0.4229	0.4921	0.8414
TD3	0.4653	0.5511	0.5081	0.6522	0.5556	0.4499	0.2285	0.5243	0.5807	0.6739	0.9037
TD4	0.1337	0.197	0.2761	0.1576	0.056	-0.0259	0.2119	0.1605	0.0869	0.3259	0.652
TD5	0.098	0.2249	0.2489	0.2082	0.0741	-0.0124	0.2065	0.2062	0.0684	0.3486	0.6676

CFA results showed that all of the items have high loadings on their respective constructs. Although Henseler et al. (2009) stated that researchers usually consider 0.7 as the referent value for all of the loadings, meaning that the loadings should be higher than 0.7, some researchers (for example Churchill Jr (1979) and Tabachnick and Fidell (2001) recommended that the reflective items that have 0.4 or higher loading value should be kept in the model. Since all of the items were modeled as reflective, 0.4 was chosen as the lowest value for loadings. Five items which did not comply with this threshold can be seen in table 4.3 below.

Table 4.3 Loadings of the deleted items

Construct	Loading
FI4: "When I am using BI application, I get distracted by other attentions very easily."	-0.275
HE4: "Using BI application bores me."	-0.738
CO2: "I feel that I have no control over my interaction with BI application."	-0.237
PIIT2: "In general, I am hesitant to try out new information technologies."	0.049
SE1: "I could complete the job using the software package if there was no one around to tell me what to do as I go."	0.369

As a result they were excluded from the model. It was mentioned earlier that in order to determine internal consistency we used Cronbach's alpha value, the results of this test also indicated how removal of items FI4, HE4, CO2, PIIT2 and SE1 might be beneficial for increasing the reliability of measurements.

Furthermore, the cross loadings were examined. Chin and Newsted (1999) stated that all of the loadings should be higher than the cross-loadings, but the actual difference between them is still the subject of debate. Some authors (Bourke (1984); Plotnikoff (1994)) are of the opinion that the difference 0.2 is enough, and that rule was followed in this paper. After removing FI4, HE4, CO2, PIIT2 and SE1 from the model, all of the cross-loadings were satisfactory.

Inter-construct correlation

Consequently, as it can be seen from the Table 4.4, all of the constructs share more variance with their indicators than with the other constructs, i.e. the shaded diagonal number is higher than the numbers below.

Table 4.4 Inter-Construct Correlations

	BI	CO	CU	FI	HE	PE	PIIT	PS	PU	SE	TD
BI	0.9146	0	0	0	0	0	0	0	0	0	0
CO	0.7251	0.912	0	0	0	0	0	0	0	0	0
CU	0.6837	0.7097	0.8786	0	0	0	0	0	0	0	0
FI	0.5674	0.6716	0.5033	0.8486	0	0	0	0	0	0	0
HE	0.582	0.626	0.756	0.6317	0.9501	0	0	0	0	0	0
PE	0.6024	0.6385	0.4837	0.663	0.6358	0.9209	0	0	0	0	0
PIIT	0.3535	0.3943	0.5425	0.2747	0.2807	0.3652	0.854	0	0	0	0
PS	0.6614	0.6639	0.726	0.6641	0.7901	0.7355	0.4344	0.8376	0	0	0
PU	0.769	0.7364	0.7187	0.676	0.655	0.6987	0.4107	0.6413	0.9456	0	0
SE	0.5043	0.5974	0.4598	0.6522	0.5445	0.561	0.3353	0.5313	0.5553	0.7234	0
TD	0.4429	0.5461	0.5499	0.6227	0.4941	0.3395	0.2971	0.5165	0.5143	0.6347	0.7833

BI: Behavioral intention to use, CO: Control, CU: Curiosity, FI: Focused Immersion, HE: Heightened Enjoyment, PE: Perceived ease of use, PIIT: Personal Innovativeness, PS: Playfulness, PU: Perceived usefulness, SE: Self-efficacy, TD: Temporal Dissociation

4.2.4. PLS outer model loading

After we have the analysis results we tested outer model loadings, which are used to prove the reliability and validity of reflective constructs. The outer model loadings of all other items on their respective constructs are shown in the table 4.5. The outer model represents the

relationships between latent variable and its observed variables (Henseler et al. 2009). However, some authors (for example Agarwal and Karahanna (2000) and (Rigdon 1998)) refer to outer models as the measurement model. Regardless of the used term, the point is that the values in the outer model provide the information about the relationship between indicators and latent variables. As it can be seen in the table, all of the loadings are significant at 0.001, furthermore proving the reliability and validity of reflective constructs.

Table 4.5 Outer model loadings

Construct	PLS Outer Loading
Cognitive absorption	
Temporal Dissociation	**0.777**
Focused Immersion	**0.847**
Heightened Enjoyment	**0.9501**
Control	**0.8465**
Curiosity	**0.7926**
Self-Efficacy	
SE2	**0.6016**
SE3	**0.6986**
SE4	**0.7725**
SE5	**0.6749**
SE6	**0.8672**
SE7	**0.7445**
SE8	**0.7291**
SE9	**0.6444**
SE10	**0.7443**
Perceived Ease-of-Use	
PE1	**0.893**
PE2	**0.9327**
PE3	**0.9512**
PE4	**0.9055**
Perceived Usefulness	
PU1	**0.9568**
PU2	**0.9376**
PU3	**0.9422**
Behavioral Intention	
BI1	**0.8949**
BI2	**0.9473**
BI3	**0.9009**

4.3. Descriptive statistics

Bhattacherjee (2012) identified two types of statistical analysis for numeric data collected in a research project - descriptive and inferential statistics. The author defined descriptive statistics as a statistical description, aggregation and presentation of the constructs of interest or representation of associations between constructs. Inferential analysis is used for theory testing, as it is a way of hypotheses testing (Bhattacherjee 2012). Descriptive statistics should start with the data preparation phase, which should prepare collected data for statistical analysis (Bhattacherjee 2012).

Two types of descriptive statistical analysis were used, central tendency and dispersion. Central tendency is defined as "an estimate of the center of a distribution of values" (Bhattacherjee 2012, p. 121). The author also identified three major estimates of central tendency, mean, median and mode, and in this study mean was used to calculate central tendency of the constructs. Mean of the values is calculated as the simple arithmetic mean between those values. On the other hand, dispersion is identified as "the way values are spread around the central tendency, for example, how tightly or how widely are the values clustered around the mean" (Bhattacherjee 2012, p. 122). In short, dispersion should explain how different respondents answered to the questions. In this study, standard deviation was used as a measure of dispersion.

The next table contains the values of mean and standard deviation for the constructs. As it can be concluded from the table 4.6, self-efficacy has the highest value for standard deviation, it is a little lower than 2.7. That means that the individual responses, on average, were 2.7 away from the mean of Self-efficacy. The lowest standard deviation value is related to the Behavioral intention to use, and it is a little over 1, which means that the individual responses are clustered around mean of the Behavioral Intention to use more tightly than in the case of the other constructs. The values for mean are between the values 4.17 and 7.67, the lowest value belongs to the Control and the highest one to Self-efficacy.

Table 4.6 Descriptive statistics results

Construct	Mean	Standard deviation
Behavioral intention to use	6.35930736	1.126572954
Perceived usefulness	5.64069264	1.378840546
Perceived ease of use	5.41233766	1.552786683
Self-efficacy	7.66753247	2.695086513
Playfulness	4.87569573	1.408081376
Personal Innovativeness	4.77922078	2.30337916
Temporal Dissociation	4.73766234	1.554636046
Focused immersion	4.4961039	1.662609556
Heightened enjoyment	4.51948052	2.028116583
Control	4.17316017	1.921707386
Curiosity	5.44155844	1.409554655

Table 4.7 represents some of the sample characteristics. As it can be concluded from the table, the respondents use/have used a number of different BI applications and some of the respondents have experience with more than one BI application. However, a great number of our respondents have the experience with Microstrategy, SAP and Qlikview BI applications. Furthermore, the average experience with the BI application is 5.722 years.

Table 4.7 Sample characteristics

BI application (number of users from sample) ***Some of the respondents have experience with more than one BI application.***	Microstrategy (19) SAP (18) Qlikview (12) Microsoft BI (7) Tableau (7) Cognos (4) SQL Server (5) Oracle (2) Informatica (2) Yellowfin (2) SAS, Birst, Cognizant 2.0, Netezza, Rapidminer, Powerpivot, Cubeplayer, Zoho (1)
Average experience with the application	5.722 years

The tables in *Appendix 3* provide a detailed overview of all items used in the questionnaire and how the frequency of the responses is spread out over the seven-point Likert-scale (for all items except Self Efficacy which is measured as a ten-point scale).

4.4. Inferential statistics

As previously mentioned, Inferential analysis is used for theory testing, as it is a way of hypotheses testing (Bhattacherjee 2012). There is a number of different numerical statistical procedures for this purpose, and most of them are supported by software applications. We chose Partial least squares analysis as our data analysis and hypotheses testing procedure for two reasons. Firstly, Agarwal and Karahanna (2000) used the PLS procedure in their paper as well. Secondly, our sample size is 77 and Chin and Newsted (1999) argue that PLS is suitable for analysis where the sample size is small. The PLS analysis was conducted using SmartPLS software. SmartPLS application is used for (graphical) path modeling with latent variables, where users can create a model based on their dataset.

4.4.1. Partial least squares

Structural equation modeling technique (SEM) has been commonly used in the empirical research. Haenlein and Kaplan (2004) defined two ways of estimating the parameters of SEM, covariance-based (the most popular being LISREL) and variance-based approaches (the most popular being PLS). Furthermore, SEM technique is often used to test theoretical assumptions with empirical data (Haenlein and Kaplan 2004). Gefen, Straub and Boudreau (2000) labeled SEM as a second-generation technique which should be used in the situations where other common methods (regression-based ones) reach their limit, i.e. in the situations where there are multiple independent and dependent constructs.

PLS was first introduced by Wold (1975) by the name Nonlinear Iterative Partial Least Squares (NIPALS) (Haenlein and Kaplan 2004). As a SEM technique, PLS is used to mitigate the limitations of regression-based techniques, which all assume that the tested models are simple (composed of one dependent and several independent variables), and when constructs are measured by a great number of indicators (Haenlein and Kaplan 2004).

Haenlein and Kaplan (2004) stressed the difference between PLS and any of the covariance-based techniques. The authors stated that covariance-based techniques focus on reproducing the empirical covariance matrix, and in contrast, PLS aims to maximize the variance of the dependent variables explained by the independent ones. PLS model consists of three parts, structural components, measurement components and weight relations (Chin and Newsted 1999). Structural component represents the relationships between the latent variables while measurement component shows the relationship between the latent variables and their indicators (Chin and Newsted 1999). Weight relations are used as estimations of the case values for the latent variables (Chin and Newsted 1999).

Previously mentioned latent variables (in this case are the constructs used in this study) are substituted by values called “unobservable variables”, which are estimated as exact linear combinations of their indicators (in this case indicators are items used to measure constructs) (Fornell and Bookstein 1982). Weight relations are estimated so that the case values represent most of the variance of the independent variables, which are furthermore used to predict values of dependent variables (Garthwaite 1994). The value for unobservable variables is calculated as a weighted (by the value of weight relations) average of its indicators, which create the model

composed of unobservable variables that can be estimated by least squares regressions (Haenlein and Kaplan 2004).

In short, as Haenlein and Kaplan (2004) stated the steps PLS contains are very simple:

1. Estimation of the weight relations (they are links between indicators and unobservable variables)
2. Calculation of case values for each unobservable variable (weighted average of its indicators)
3. Determination of parameters for the structural relations (case values are used in regression equations)

where the most important part in this process is the estimation of the weight relations.

PLS has two main advantages. Fornell and Bookstein (1982) stated that one of the biggest advantages is the fact that the size of population or scale of measurement are not important for calculations in PLS. Furthermore, Haenlein and Kaplan (2004) stressed that PLS, as already mentioned, can overcome limits of covariance-based methods, for example, in the situations where the number of indicators is large. On the other hand, there are some problems associated with PLS. Fornell and Cha (1994) stated that PLS has some issues with inconsistency, since the case values for the latent variables are calculated based on values that involve measurement error. Other problem is related to the nature of the real-life situations, where the number of cases in the sample and the number of indicators of latent variables is limited (Haenlein and Kaplan 2004). In those type of situations, PLS usually underestimates the correlations between latent variables and overestimates the loadings (Dijkstra 1983).

PLS model in this paper

- structural component: in this case structural component of the PLS model consists of the relationships between the before-mentioned seven constructs: personal innovativeness, playfulness, perceived usefulness, perceived ease-of-use, self-efficacy, behavioral intention to use and cognitive absorption. The assumed relationships between those constructs can be seen from the theoretical model.
- measurement component: consists of the relationships between the constructs and their indicators, i. e. the items that are used to measure the constructs.
- weight relations: weights that are used as estimations of the case values for the constructs

4.4.2. PLS results

As previously mentioned, SmartPls was used for analysis purposes. The software allows users to create models and connect them to the existing data set (should be comma separated .csv format). All the models created in SmartPls are based on our theoretical model (figure 4.3) with equal layout and relationships between constructs, however the appearance is different according to the software used.

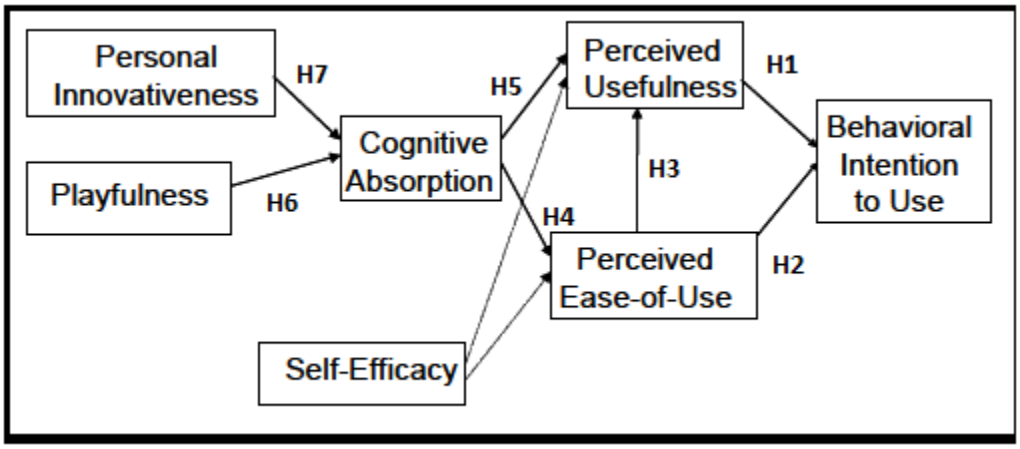

Figure 4.3 Theoretical model (Agarwal and Karahanna, 2000)

The initial version of the model created in SmartPLS is represented in Figure 4.4. Besides the constructs (colored blue), it displays all measurement items for the constructs (colored yellow). All the constructs are modeled as reflective. This initial model was created without five dimensions included in CA (temporal dissociation, focused immersion, heightened enjoyment, control and curiosity) since they have to be modeled based on the values calculated in the second model.

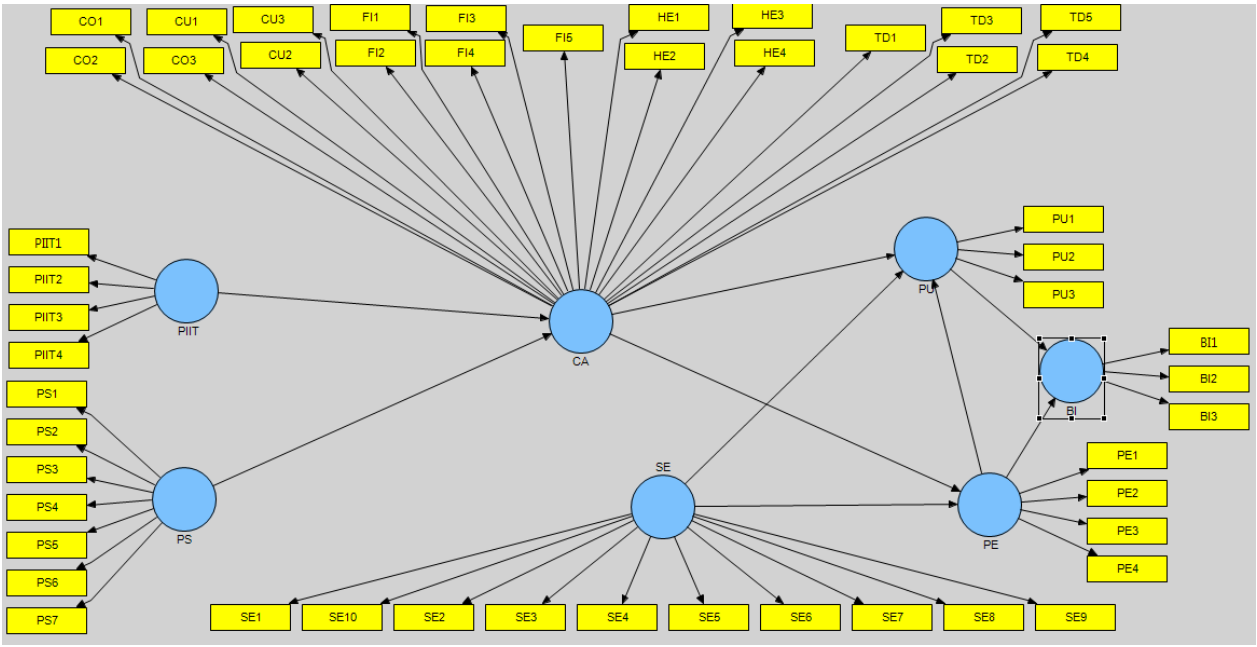

Figure 4.4 Initial PLS model

The next step included creating a new model with the added five dimensions for CA (colored green), which were not included in the initial model. The dimensions were connected to the CA construct, with each of the dimensions connected to items measuring it. The results of PLS analysis for the second model can be seen in the figure 4.5.

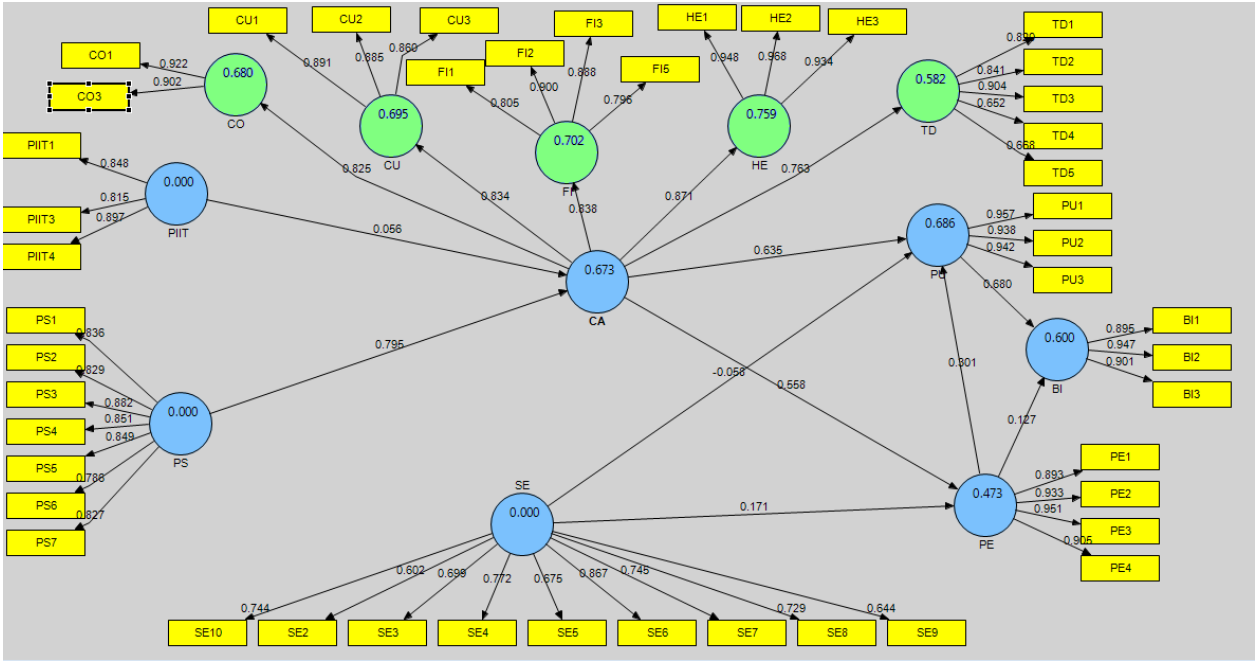

Figure 4.5 Second model PLS analysis

In order to model CA as second order construct, the latent variable scores from the second PLS analysis were added to the initial data set. The data set was reloaded into the model and new values showed in the list of the indicators. Those indicators were used as items for the constructs and figure 4.6 illustrates the final model after running PLS analysis once again, with CA as a second order construct. The model contains path coefficients and variances for the tested theoretical model.

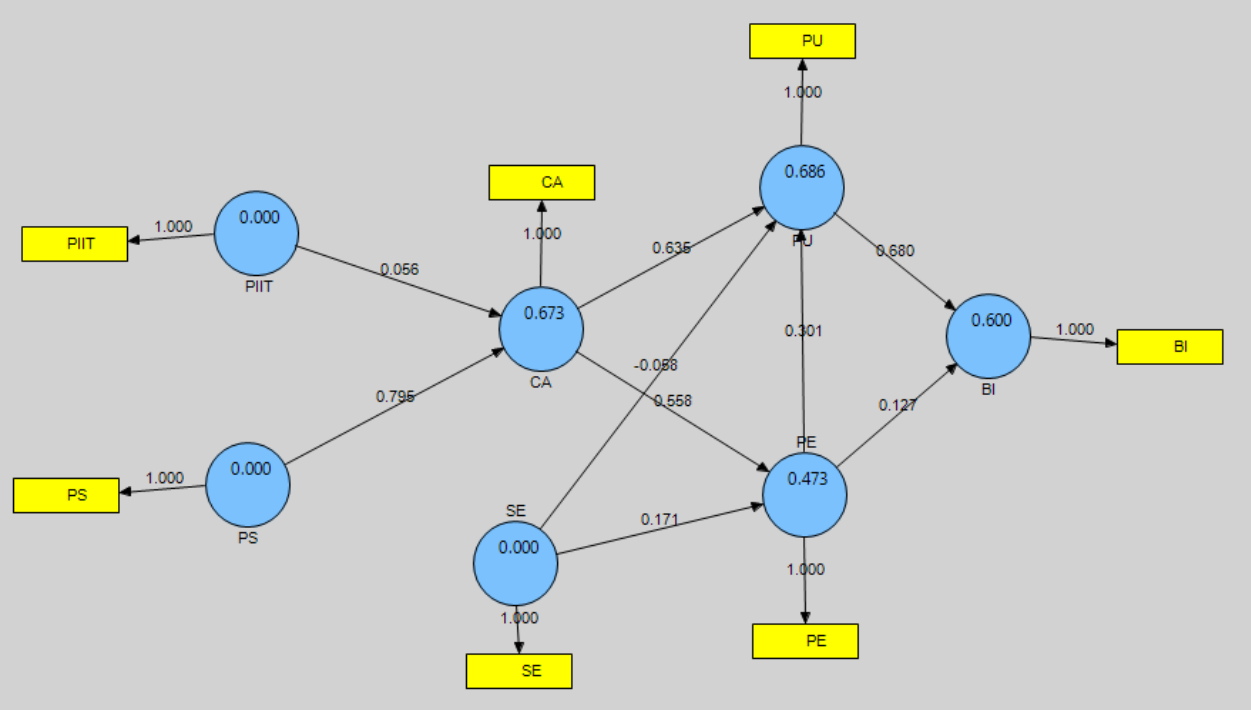

Figure 4.6 PLS results

Playfulness itself explains 67.3% of the variance in cognitive absorption, while cognitive absorption and perceived ease of use explain 68.6% of the variance in perceived usefulness. Furthermore, self-efficacy and cognitive absorption together explain 47.3% of the variance in perceived ease of use. Finally, perceived usefulness and perceived ease of use explain 60% of the variance in behavioral intention to use. The analysis of tested hypotheses is based on the table 4.8.

Table 4.8 T-statistics results

Hypothesis	Path: From->To	T Statistics	Significance
H4: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived ease of use of the BI application.	**Cognitive absorption -> Perceived ease of use**	**4.3516**	**0.01**
H5: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived usefulness of the BI application.	**Cognitive absorption -> Perceived usefulness**	**6.0891**	**0.01**
H2: Perceived ease of use of a BI application has a positive effect on behavioral intention to use the BI application.	**Perceived ease of use -> Behavioral intention to use**	**0.9762**	*****
H3: Perceived ease of use of a BI application has a positive effect on the perceived usefulness of the BI application.	**Perceived ease of use -> Perceived usefulness**	**3.2346**	**0.01**

H7: Personal innovativeness has a positive effect on cognitive absorption with a BI application.	**Personal innovativeness-> Cognitive absorption**	**0.5671**	*****
H6: Computer playfulness has a positive effect on cognitive absorption with a BI application.	**Playfulness -> Cognitive absorption**	**9.9628**	**0.01**
H1: Perceived usefulness of a BI application has a positive effect on behavioral intention to use the BI application.	**Perceived usefulness -> Behavioral intention to use**	**6.0975**	**0.01**
*** Indicates that the significance value is higher than 0.1, thus it is not acceptable.**			

The first column shows the tested hypotheses and the second the paths representing the hypotheses. Third column shows T-statistics value and the fourth one the significance level. As it can be concluded, three of the tested paths do not demonstrate significant values, thus the hypotheses

- *H2: Perceived ease of use of a BI application has a positive effect on behavioral intention to use the BI application.*
- *H7: Personal innovativeness has a positive effect on cognitive absorption with a BI application.*

will be rejected. That means that in the case of the chosen target technology - BI, perceived ease of use does not positively affect perceived usefulness and cognitive absorption doesn't positively influence perceived usefulness of the BI application.

On the other hand, hypotheses

- *H1: Perceived usefulness of a BI application has a positive effect on behavioral intention to use the BI application*
- *H3: Perceived ease of use of a BI application has a positive effect on the perceived usefulness of the BI application.*
- *H4: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived ease of use of the BI application*
- *H5: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived usefulness of the BI application.*
- *H6: Computer playfulness has a positive effect on cognitive absorption with an BI application*

are proven.

Summary of all of the hypotheses is presented in the table 4.9 and the detailed analysis of the proven hypotheses is presented in the Discussion chapter.

Table 4.9 Summary of the hypotheses

Summary of Hypothesis Tests	
Hypothesis	**Support**
H1: Perceived usefulness of a BI application has a positive effect on behavioral intention to use the BI application	**YES**
H2: Perceived ease of use of a BI application has a positive effect on behavioral intention to use the BI application.	**NO**
H3: Perceived ease of use of a BI application has a positive effect on the perceived usefulness of the BI application.	**YES**
H4: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived ease of use of the BI application.	**YES**
H5: After controlling for self-efficacy perceptions, cognitive absorption with a BI application has a positive effect on the perceived usefulness of the BI application.	**YES**
H6: Computer playfulness has a positive effect on cognitive absorption with a BI application.	**YES**
H7: Personal innovativeness has a positive effect on cognitive absorption with a BI application.	**NO**

4.4.3. Direct Cognitive absorption-Behavioral intention to use connection results

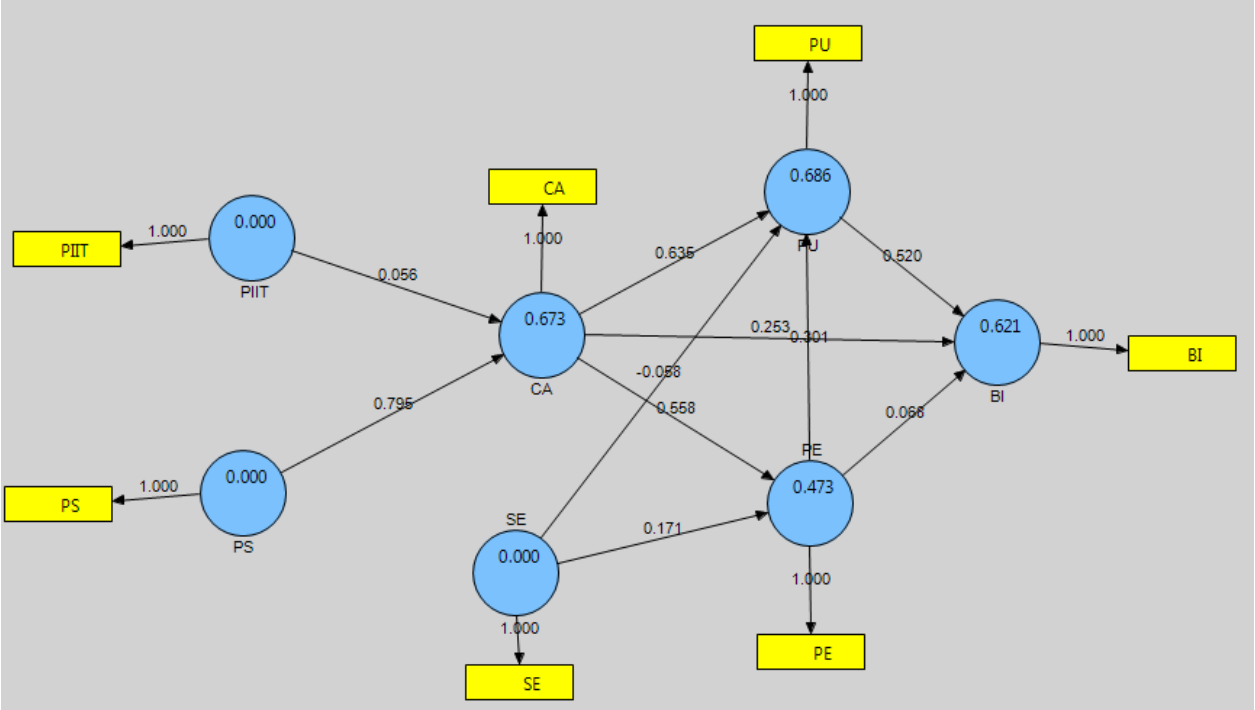

Figure 4.7 Cognitive absorption - Behavioral intention direct path

After the analysis of the tested model, new analysis was conducted and the results are presented in the figure 4.7. Agarwal and Karahanna (2000) analyzed a model containing a direct path from cognitive absorption to behavioral intention in order to determine if the collected data supported the full effect of cognitive absorption on behavioral intention to use the target technology (in their case target technology was World Wide Web).

Consequently, the same additional analysis was conducted in this paper based on data collected from BI application users. As it can be seen in Table 4.10, from the value of t-statistics, there is a significant direct path from cognitive absorption to behavioral intention to use BI applications, meaning that cognitive absorption with a BI application positively influences the behavioral intention to use BI application.

Table 4.10 Direct path CA-BI t-statistics

Path	T Statistics	Significance at
Cognitive absorption -> Behavioral intention to use	**1.8042**	**0.1**

5. Discussion of findings

Out of seven beginning hypotheses, the end PLS analysis of our data showed two of the hypotheses as not supported when it comes to the usage of a BI application, while other five were proven.

The data did not support second hypothesis (H2) showing that perceived ease of use does not positively affect the behavioral intention to use the BI application. This result is not consistent with findings in Agarwal and Karahanna (2000), but his may not be surprising since the setting for our chosen technology was an organizational setting with the technology use being obligatory in the office environment. This is the main difference between our study and Agarwal and Karahanna (2000) paper, which used World Wide Web as their chosen technology with students of business school as the target population. In work environment the use of a BI application is mandated, thus the results are expected to be different.

However, this does not mean how the behavioral intention construct cannot be accurately measured in a work setting since the use of a technology is mandated. This is shown by evidently strong support for H1 which states how perceived usefulness has a positive influence on the behavioral intention to use the BI application. This result is in accordance with previous research by Agarwal and Karahanna (2000) as well as by Davis (1989). These results can be explained by the fact that the importance of usefulness of a technology in an organizational environment is much greater over its ease of use, where users need time to learn to operate a more difficult interface to benefit from the value it brings. Davis (1989) affirm how perceived usefulness plays a much bigger role in the determinant of people's intentions to use computers than perceived ease of use does, stating how no matter how easy to use a system is, it will never compensate for it not performing a useful task.

The other rejected hypothesis (H7) indicates how personal innovativeness does not positively influence cognitive absorption with the BI application. This hypothesis is related with finding the determinants of CA with regard to BI applications. This shows how personal characteristics of an individual, such as the desire to try out new information technologies, do not have an influence on achieving the state of deep involvement with a BI application. This result is not consistent with Agarwal and Karahanna (2000) study, however Lu, Yao and Yu (2005) discuss how studies examining the personal innovativeness construct have not been consistent over the years and how the results usually differ based on sample and context.

The other hypotheses discussed in further text were all supported by our data.

In contrast to the results obtained by Agarwal and Karahanna (2000), H3 was supported, which means that users that perceive BI application as easy to use will perceive it as useful for their work tasks. Considering the items in perceived ease of use such as “I find it easy to get the BI application to do what I want it to do.” and “It is easy for me to become skillful at using the BI application” it may be reasonable to perceive how these perceptions have a positive influence on effectiveness and productivity, which are contained in perceived usefulness construct.

Additionally, this relationship between perceived ease of use and usefulness has been supported by other research (Davis (1989); Saadé and Bahli (2005)).

Hypothesis four (H4) was also supported, showing that cognitive absorption with an information technology has a positive effect on the perceived ease of use as well as H5 showing that cognitive absorption has a positive effect on the perceived usefulness. These results were not unexpected, since they are in accordance with those from Agarwal and Karahanna (2000) as well as other researchers. Additionally, H5 has a stronger support than H4, which also agrees with prior research.

The last proven hypothesis, H6, was strongly supported, which is shown by t-statistics value for this path being 9.9628. From this it can be concluded that playfulness has a positive effect on cognitive absorption. This result is the same as in Agarwal and Karahanna (2000) study, showing how this individual trait plays a big role in achieving cognitive absorption with the BI application.

The direct path between CA and BI was also tested in order to examine the full effect of cognitive absorption on behavioral intention. The results showed a significant direct path between these two constructs, and proved the value of CA in understanding the acceptance and behavioral intention to use BI applications.

6. Conclusion

The final part of the thesis will answer our research questions presented in the introduction section. This section will concentrate on the hypotheses that were used in relation to our research questions, while the explanation of the complete results is presented in the Discussion section. Furthermore, we will discuss the theoretical and practical implications of our results. Since there are some limitations to our study, we will explain them and relate some of them to the possible future research which could be beneficial to the theory as well as practice.

6.1. Research questions

The first research question aimed to explore the determinants of CA with regard to business intelligence applications. The theoretical model used in this study (presented in Agarwal and Karahanna (2000)) considered personal innovativeness and playfulness as constructs that significantly influence CA. After the analysis of the obtained data, it has been shown that playfulness is a significant determinant of the cognitive absorption with regard to the BI applications. On the other hand, personal innovativeness was not supported as a predictor and determinant of cognitive absorption in our study.

The second research question addressed the influence of CA on the behavioral intention to use business intelligence applications. The results showed that there is a significant direct influence of CA on the behavioral intention, as well as how CA has an influence of the perceived usefulness of the application. Since results also show that perceived usefulness influences behavioral intention, it can be concluded that besides the direct effect of CA on behavioral intention, there is an additional indirect effect through the perceived usefulness.

6.2. Implications

By identifying the determinants of cognitive absorption when using BI applications and examining the effect of cognitive absorption on the intention to use BI applications we extended the knowledge on the topic of relationship of users and IT and added to the scientific community. The performed study leads to several implications for both theory and practice.

By using BI as the target technology, we managed to empirically test and prove the importance of intrinsic motivators in an organizational setting and with the use of mandated technology. Since most studies focus on voluntarily used technologies, this type of research is needed to determine whether these types of variables are beneficial in other contexts. Through testing the theoretical model presented by Agarwal and Karahanna (2000) we further confirmed the importance of cognitive absorption in users' perception of information technologies. However, not all of the conclusions we came to were in accordance with their research. For this reason it would be

beneficial to further explore the influence of characteristics such as personal innovativeness on cognitive absorption when using mandated technologies. Additionally, there may be other personal characteristic which may be relevant, and can be added to the model.

There are several implications for practice as well. The results showed a strong significance of playfulness as the determinant of cognitive absorption. Through identifying those users with a higher degree of playfulness managers could assign these users as important decision makers in the organization, thus increasing the use of BI and the company's performance. Since the data showed how cognitive absorption has an influence on perceived usefulness and the behavioral intention to use the BI application, the awareness of the importance of these relationships needs to be considered when designing BI applications, allowing for visually engaging interface to increase the chance of experiencing cognitive absorption. Better understanding of factors which positively influence the behavioral intention toward using BI applications gives valuable insights to designers, trainers, and stakeholders, allowing them to focus on users' needs. Besides the traditional focus on ease of use and usefulness in these applications, this research proves it is important to pay attention to intrinsic motivators which significantly influence the way users work with the applications. Including these findings in the design of applications and in the organizational environment will result in enhanced adoption and usage of BI applications, thus increasing the performance and decision making process throughout the organization.

6.3. Limitations

There are several limitations to this study which can have an impact on its findings. All of them are related to the aspect of data gathering. The first limitation is the sample size acquired for the research. The aim was to gather information from end-users of BI through administering an online questionnaire, which proved to be a challenging task. The access to people and organizations from which this data could be gathered was limited, with some individuals and organizations not being willing to participate in the study. This is reflected in a low response rate, with more than 250 sent out direct emails, together with posting on online communities such as LinkedIn and various technical forums, resulting in a final respondent number of 77. Another limitation is the insufficient amount of time available in order to investigate the problem and gather data. The small sample size caused by limited access and a lack of time available may impact the relationships found from the data available. The acquired sample may not act as true representation of all individuals and their relationship with this technology, impacting the result generalization.

Some of the problems associated with the method we used for data analysis also exist where Fornell and Cha (1994) stated how there are some issues with inconsistency, and Haenlein and Kaplan (2004) discuss the problem related to the nature of the real-life situations where the number of cases in the sample and the number of indicators of latent variables is limited. In those type of situations, PLS usually underestimates the correlations between latent variables and overestimates the loadings (Dijkstra 1983).

6.4. Further study

Because of the mentioned limitations there are several aspects through which the ideas presented in this paper could be further researched.

Greater sample size - because of the problems related to the sample size resulting in limited number of responses, further research would benefit from a greater sample size, possibly uncovering new important relationships and/or confirming the ones already found and achieving greater result generalizability.

Exploring other factors - The authors have explored the theoretical model and factors as they are presented in the Agarwal and Karahanna (2000) paper, and identified the determinants of CA and its influence on the behavioral intention to use a BI application. We identified how playfulness I an important determinant to CA, while personal innovativeness did not play a role. However, there may be other variables to be researched. The framework used can be expanded by including other variables present in the literature, which were not included in the study by Agarwal and Karahanna (2000) and explore their influence on the interaction with a BI application in order to gain better understanding of these relationships. Additionally, researchers could use the findings from our study to further explore only those relationships which were found to have the highest significance, especially with technologies that are used in mandated organizational settings.

Exploring differences between desktop and mobile BI application - this study included all BI application regardless of the device used, an interesting aspect to explore would be to see if there are any differences between different types of BI applications, such as mobile and desktop applications and the influence of CA on the intention to use these different application. However, since mobile BI is still not widely used across organizations, it may need some time in order to be able to gather enough data for this type of research.

7. APPENDIX 1 - Research questionnaire

The questions below aim to explore the concept of cognitive absorption, which is defined as a state of deep involvement with software, as well as other factors influencing the acceptance of BI application inside an organization. When answering the questions relating to different concepts, keep in mind one specific BI application you work/have worked with.

Open ended questions	
Role in the company.	
The name of BI application you work with.	
Years/Months (indicate which) of experience with BI application.	
Type of usage of BI application (Sales support, management tool, in the field, etc.).	
Closed questions	
Temporal Dissociation	
1. Time appears to go by very quickly when I am using BI application.	
2. Sometimes I lose track of time when I am using BI application.	
3. Time flies when I am using BI application.	
4. Most times when I use BI application, I end up spending more time that I had planned.	
5. I often spend more time using BI application than I had intended.	
Focused Immersion	
6. While using BI application I am able to block out most other distractions.	
7. While using BI application, I am absorbed in what I am doing.	
8. While I am using BI application, I am immersed in the task I am performing.	
9. When I am using BI application, I get distracted by other attentions very easily.	
10. While I am using BI application, my attention does not get diverted very easily.	
Heightened Enjoyment	
11. I have fun interacting with BI application.	
12. Using BI application provides me with a lot of enjoyment.	
13. I enjoy using BI application.	
14. Using BI application bores me.	
Control	
15. When using BI application I feel in control.	
16. I feel that I have no control over my interaction with BI application.	
17. BI application allows me to control my interactions with the software.	
Curiosity	
18. Using BI application excites my curiosity.	
19. Interacting with BI application makes me curious.	
20. Using BI application arouses my imagination.	
Perceived Ease of Use	
21. Learning to operate a BI application is easy for me.	

22. I find it easy to get the BI application to do what I want it to do.	
23. It is easy for me to become skillful at using the BI application.	
24. I find the BI application easy to use.	
Perceived Usefulness	
25. Using BI application enhances my effectiveness at work.	
26. Using BI application enhances my productivity.	
27. I find BI application useful in my work activities.	
Personal Innovativeness	
28. If I heard about a new information technology, I would look for ways to experiment with it.	
29. In general, I am hesitant to try out new information technologies.	
30. Among my colleagues, I am usually the first to try out new information technologies.	
31. I like to experiment with new information technologies.	
Playfulness	
32. When using BI application I am spontaneous.	
33. When using BI application I am imaginative.	
34. When using BI application I am flexible.	
35. When using BI application I am creative.	
36. When using BI application I am playful.	
37. When using BI application I am original.	
38. When using BI application I am inventive.	
Behavioral Intention to Use	
39. I plan to use BI application in the future.	
40. I intend to continue using BI application in the future.	
41. I expect my use of BI application to continue in the future.	

Self-Efficacy

The following set of questions aims to explore the software packages that intend to make your work easier. Imagine that you were given a new software (it doesn't matter specifically what is the purpose of the software) which should help and make your work tasks easier. The questions represent a set of conditions under which you could/couldn't use the software. For each question, please indicate whether you think you could complete the work task using the software.

Choose either YES or NO.

Then, for each question that you answered YES, please rate your confidence level about your first judgment by choosing the number from 1 to 10.

1 indicates - Not at all confident
10 indicates - Totally confident.

You may choose any number in this range.

I could complete the job using the software package...	YES/NO	Confidence if YES (1-10)
..if there was no one around to tell me what to do as I go.		

..if I had never used a package like it before.		
..if I had only the software manuals for reference.		
..if I had seen someone else using it before trying it myself.		
..if I could call someone for help if I got stuck.		
..if someone else had helped me get started.		
..if I had a lot of time to complete the job for which the software was provided.		
..if I had just the built-in help facility for assistance.		
..if someone showed me how to do it first.		
...if I had used similar packages like this one before to do the job.		

8. APPENDIX 2 - Measurement items

Construct	Measurement items
Temporal Dissociation (TD)	TD1 - Time appears to go by very quickly when I am using BI application. TD2 - Sometimes I lose track of time when I am using BI application. TD3 - Time flies when I am using BI application. TD4 - Most times when I use BI application, I end up spending more time that I had planned. TD5 - I often spend more time using BI application than I had intended.
Focused Immersion (FI)	FI1 - While using BI application I am able to block out most other distractions. FI2 - While using BI application, I am absorbed in what I am doing. FI3 - While I am using BI application, I am immersed in the task I am performing. FI4 - When I am using BI application, I get distracted by other attentions very easily. FI5 - While I am using BI application, my attention does not get diverted very easily.
Heightened Enjoyment (HE)	HE1 - I have fun interacting with BI application. HE2 - Using BI application provides me with a lot of enjoyment. HE3 - I enjoy using BI application. HE4 - Using BI application bores me.
CO = Control (CO)	CO1 - When using BI application I feel in control. CO2 - I feel that I have no control over my interaction with BI application. CO3 - BI application allows me to control my interactions with the software.
Curiosity (CU)	CU1 - Using BI application excites my curiosity. CU2 - Interacting with BI application makes me curious. CU3 - Using BI arouses my imagination.
Personal Innovativeness (PIIT)	PIIT1 - If I heard about a new information technology, I would look for ways to experiment with it. PIIT2 - In general, I am hesitant to try out new information technologies. PIIT3 - Among my colleagues, I am usually the first to try out new information technologies. PIIT4 - I like to experiment with new information

	technologies.
Playfulness (CPS)	PS1 - When using BI application I am spontaneous. PS2 - When using BI application I am imaginative. PS3 - When using BI application I am flexible. PS4 - When using BI application I am creative. PS5 - When using BI application I am playful. PS6 - When using BI application I am original. PS7 - When using BI application I am inventive.
Perceived Usefulness (PU)	PU1 - Using BI enhances my effectiveness at work. PU2 - Using BI enhances my productivity. PU3 - I find BI useful in my work activities.
Perceived Ease of Use (PEOU)	PEOU1 - Learning to operate a BI application is easy for me. PEOU2 - I find it easy to get the BI application to do what I want it to do. PEOU3 - It is easy for me to become skillful at using the BI application . PEOU4 - I find the BI application easy to use.
Behavioral Intention (BI)	BI1 - I plan to use BI application in the future. BI2 - I intend to continue using BI application in the future. BI3 - I expect my use of BI application to continue in the future.
Self-Efficacy (SE)	I could complete the job using the software package... SE1 - if there was no one around to tell me what to do as I go. SE2 - if I had never used a package like it before. SE3 - if I had only the software manuals for reference. SE4 - if I had seen someone else using it before trying it myself. SE5 - if I could call someone for help if I got stuck. SE6 - if someone else had helped me get started. SE7 - if I had a lot of time to complete the job for which the software was provided. SE8 - if I had just the built-in help facility for assistance. SE9 - if someone showed me how to do it first. SE10 - if I had used similar packages like this one before to do the job.

9. APPENDIX 3 - Summary of descriptive statistics

10. **TD1**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	4	6.1	6.1	6.1
	2.0	1	1.5	1.5	7.6
	3.0	4	6.1	6.1	13.6
	4.0	16	24.2	24.2	37.9
	5.0	18	27.3	27.3	65.2
	6.0	9	13.6	13.6	78.8
	7.0	14	21.2	21.2	100.0
	Total	66	100.0	100.0	

TD2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	5	7.6	7.6	12.1
	3.0	5	7.6	7.6	19.7
	4.0	15	22.7	22.7	42.4
	5.0	18	27.3	27.3	69.7
	6.0	12	18.2	18.2	87.9
	7.0	8	12.1	12.1	100.0

	Total	66	100.0	100.0	

TD3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	3	4.5	4.5	9.1
	3.0	6	9.1	9.1	18.2
	4.0	18	27.3	27.3	45.5
	5.0	17	25.8	25.8	71.2
	6.0	12	18.2	18.2	89.4
	7.0	7	10.6	10.6	100.0
	Total	66	100.0	100.0	

TD4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	4	6.1	6.1	9.1
	3.0	7	10.6	10.6	19.7
	4.0	12	18.2	18.2	37.9
	5.0	15	22.7	22.7	60.6
	6.0	18	27.3	27.3	87.9
	7.0	8	12.1	12.1	100.0

	Total	66	100.0	100.0	

TD5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	6	9.1	9.1	12.1
	3.0	4	6.1	6.1	18.2
	4.0	17	25.8	25.8	43.9
	5.0	16	24.2	24.2	68.2
	6.0	12	18.2	18.2	86.4
	7.0	9	13.6	13.6	100.0
	Total	66	100.0	100.0	

FI1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	7	10.6	10.6	13.6
	3.0	10	15.2	15.2	28.8
	4.0	12	18.2	18.2	47.0
	5.0	10	15.2	15.2	62.1

	6.0	14	21.2	21.2	83.3
	7.0	11	16.7	16.7	100.0
	Total	66	100.0	100.0	

FI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	1	1.5	1.5	3.0
	3.0	5	7.6	7.6	10.6
	4.0	10	15.2	15.2	25.8
	5.0	15	22.7	22.7	48.5
	6.0	23	34.8	34.8	83.3
	7.0	11	16.7	16.7	100.0
	Total	66	100.0	100.0	

FI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	3	4.5	4.5	7.6
	3.0	3	4.5	4.5	12.1
	4.0	10	15.2	15.2	27.3
	5.0	13	19.7	19.7	47.0

	6.0	24	36.4	36.4	83.3
	7.0	11	16.7	16.7	100.0
	Total	66	100.0	100.0	

FI4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	22	33.3	33.3	37.9
	3.0	15	22.7	22.7	60.6
	4.0	20	30.3	30.3	90.9
	5.0	3	4.5	4.5	95.5
	6.0	2	3.0	3.0	98.5
	7.0	1	1.5	1.5	100.0
	Total	66	100.0	100.0	

FI5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	5	7.6	7.6	9.1
	3.0	13	19.7	19.7	28.8
	4.0	17	25.8	25.8	54.5

	5.0	8	12.1	12.1	66.7
	6.0	16	24.2	24.2	90.9
	7.0	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

HE1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	4	6.1	6.1	10.6
	3.0	4	6.1	6.1	16.7
	4.0	8	12.1	12.1	28.8
	5.0	8	12.1	12.1	40.9
	6.0	25	37.9	37.9	78.8
	7.0	14	21.2	21.2	100.0
	Total	66	100.0	100.0	

HE2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	4	6.1	6.1	10.6
	3.0	2	3.0	3.0	13.6

	4.0	11	16.7	16.7	30.3
	5.0	14	21.2	21.2	51.5
	6.0	15	22.7	22.7	74.2
	7.0	17	25.8	25.8	100.0
	Total	66	100.0	100.0	

HE3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	3.0	1	1.5	1.5	6.1
	4.0	10	15.2	15.2	21.2
	5.0	17	25.8	25.8	47.0
	6.0	16	24.2	24.2	71.2
	7.0	19	28.8	28.8	100.0
	Total	66	100.0	100.0	

HE4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	20	30.3	30.3	30.3
	2.0	25	37.9	37.9	68.2
	3.0	9	13.6	13.6	81.8
	4.0	5	7.6	7.6	89.4

	5.0	3	4.5	4.5	93.9
	6.0	1	1.5	1.5	95.5
	7.0	3	4.5	4.5	100.0
	Total	66	100.0	100.0	

CO1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	2	3.0	3.0	4.5
	3.0	4	6.1	6.1	10.6
	4.0	5	7.6	7.6	18.2
	5.0	17	25.8	25.8	43.9
	6.0	26	39.4	39.4	83.3
	7.0	11	16.7	16.7	100.0
	Total	66	100.0	100.0	

CO2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	24	36.4	36.4	36.4
	2.0	28	42.4	42.4	78.8
	3.0	4	6.1	6.1	84.8

	4.0	1	1.5	1.5	86.4
	5.0	4	6.1	6.1	92.4
	6.0	3	4.5	4.5	97.0
	7.0	2	3.0	3.0	100.0
	Total	66	100.0	100.0	

CO3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	3.0	4	6.1	6.1	9.1
	4.0	12	18.2	18.2	27.3
	5.0	20	30.3	30.3	57.6
	6.0	21	31.8	31.8	89.4
	7.0	7	10.6	10.6	100.0
	Total	66	100.0	100.0	

CU1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	3.0	2	3.0	3.0	6.1
	4.0	8	12.1	12.1	18.2

	5.0	12	18.2	18.2	36.4
	6.0	23	34.8	34.8	71.2
	7.0	19	28.8	28.8	100.0
	Total	66	100.0	100.0	

CU2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	3.0	1	1.5	1.5	6.1
	4.0	6	9.1	9.1	15.2
	5.0	13	19.7	19.7	34.8
	6.0	29	43.9	43.9	78.8
	7.0	14	21.2	21.2	100.0
	Total	66	100.0	100.0	

CU3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	4	6.1	6.1	9.1
	4.0	9	13.6	13.6	22.7

	5.0	13	19.7	19.7	42.4
	6.0	24	36.4	36.4	78.8
	7.0	14	21.2	21.2	100.0
	Total	66	100.0	100.0	

PE1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	3	4.5	4.5	6.1
	3.0	3	4.5	4.5	10.6
	4.0	4	6.1	6.1	16.7
	5.0	12	18.2	18.2	34.8
	6.0	20	30.3	30.3	65.2
	7.0	23	34.8	34.8	100.0
	Total	66	100.0	100.0	

PE2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	3	4.5	4.5	6.1
	3.0	3	4.5	4.5	10.6

	4.0	8	12.1	12.1	22.7
	5.0	11	16.7	16.7	39.4
	6.0	24	36.4	36.4	75.8
	7.0	16	24.2	24.2	100.0
	Total	66	100.0	100.0	

PE3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.0	3	4.5	4.5	4.5
	3.0	2	3.0	3.0	7.6
	4.0	6	9.1	9.1	16.7
	5.0	14	21.2	21.2	37.9
	6.0	14	21.2	21.2	59.1
	7.0	27	40.9	40.9	100.0
	Total	66	100.0	100.0	

PE4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	3	4.5	4.5	6.1
	3.0	8	12.1	12.1	18.2
	4.0	4	6.1	6.1	24.2

	5.0	12	18.2	18.2	42.4
	6.0	13	19.7	19.7	62.1
	7.0	25	37.9	37.9	100.0
	Total	66	100.0	100.0	

PU1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	3.0	5	7.6	7.6	9.1
	4.0	3	4.5	4.5	13.6
	5.0	14	21.2	21.2	34.8
	6.0	19	28.8	28.8	63.6
	7.0	24	36.4	36.4	100.0
	Total	66	100.0	100.0	

PU2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	3.0	5	7.6	7.6	9.1

	4.0	5	7.6	7.6	16.7
	5.0	17	25.8	25.8	42.4
	6.0	18	27.3	27.3	69.7
	7.0	20	30.3	30.3	100.0
	Total	66	100.0	100.0	

PU3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.0	2	3.0	3.0	3.0
	3.0	3	4.5	4.5	7.6
	4.0	4	6.1	6.1	13.6
	5.0	10	15.2	15.2	28.8
	6.0	20	30.3	30.3	59.1
	7.0	27	40.9	40.9	100.0
	Total	66	100.0	100.0	

PIIT1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.0	1	1.5	1.5	1.5
	4.0	4	6.1	6.1	7.6
	5.0	15	22.7	22.7	30.3

	6.0	28	42.4	42.4	72.7
	7.0	18	27.3	27.3	100.0
	Total	66	100.0	100.0	

PIIT2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	33	50.0	50.0	50.0
	2.0	19	28.8	28.8	78.8
	3.0	6	9.1	9.1	87.9
	4.0	1	1.5	1.5	89.4
	5.0	2	3.0	3.0	92.4
	6.0	3	4.5	4.5	97.0
	7.0	2	3.0	3.0	100.0
	Total	66	100.0	100.0	

PIIT3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.0	1	1.5	1.5	1.5
	3.0	2	3.0	3.0	4.5
	4.0	15	22.7	22.7	27.3
	5.0	14	21.2	21.2	48.5

	6.0	17	25.8	25.8	74.2
	7.0	17	25.8	25.8	100.0
	Total	66	100.0	100.0	

PIIT4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.0	1	1.5	1.5	1.5
	4.0	4	6.1	6.1	7.6
	5.0	16	24.2	24.2	31.8
	6.0	21	31.8	31.8	63.6
	7.0	24	36.4	36.4	100.0
	Total	66	100.0	100.0	

PS1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	2	3.0	3.0	3.0
	2.0	3	4.5	4.5	7.6
	3.0	8	12.1	12.1	19.7
	4.0	10	15.2	15.2	34.8
	5.0	21	31.8	31.8	66.7
	6.0	16	24.2	24.2	90.9

	7.0	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

PS2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	2	3.0	3.0	4.5
	3.0	2	3.0	3.0	7.6
	4.0	11	16.7	16.7	24.2
	5.0	15	22.7	22.7	47.0
	6.0	29	43.9	43.9	90.9
	7.0	6	9.1	9.1	100.0
	Total	66	100.0	100.0	

PS3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	1	1.5	1.5	3.0
	3.0	7	10.6	10.6	13.6
	4.0	12	18.2	18.2	31.8
	5.0	8	12.1	12.1	43.9

	6.0	27	40.9	40.9	84.8
	7.0	10	15.2	15.2	100.0
	Total	66	100.0	100.0	

PS4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	3.0	4	6.1	6.1	7.6
	4.0	14	21.2	21.2	28.8
	5.0	17	25.8	25.8	54.5
	6.0	22	33.3	33.3	87.9
	7.0	8	12.1	12.1	100.0
	Total	66	100.0	100.0	

PS5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	3	4.5	4.5	4.5
	2.0	3	4.5	4.5	9.1
	3.0	6	9.1	9.1	18.2
	4.0	17	25.8	25.8	43.9
	5.0	14	21.2	21.2	65.2
	6.0	16	24.2	24.2	89.4

	7.0	7	10.6	10.6	100.0
	Total	66	100.0	100.0	

PS6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	3	4.5	4.5	6.1
	3.0	7	10.6	10.6	16.7
	4.0	22	33.3	33.3	50.0
	5.0	22	33.3	33.3	83.3
	6.0	6	9.1	9.1	92.4
	7.0	5	7.6	7.6	100.0
	Total	66	100.0	100.0	

PS7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	2.0	2	3.0	3.0	4.5
	3.0	4	6.1	6.1	10.6
	4.0	10	15.2	15.2	25.8
	5.0	18	27.3	27.3	53.0

	6.0	24	36.4	36.4	89.4
	7.0	7	10.6	10.6	100.0
	Total	66	100.0	100.0	

BI1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	1	1.5	1.5	1.5
	3.0	1	1.5	1.5	3.0
	4.0	4	6.1	6.1	9.1
	5.0	6	9.1	9.1	18.2
	6.0	7	10.6	10.6	28.8
	7.0	47	71.2	71.2	100.0
	Total	66	100.0	100.0	

BI2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.0	1	1.5	1.5	1.5
	4.0	4	6.1	6.1	7.6
	5.0	7	10.6	10.6	18.2
	6.0	8	12.1	12.1	30.3
	7.0	46	69.7	69.7	100.0

	Total	66	100.0	100.0	

BI3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.0	1	1.5	1.5	1.5
	4.0	4	6.1	6.1	7.6
	5.0	4	6.1	6.1	13.6
	6.0	8	12.1	12.1	25.8
	7.0	49	74.2	74.2	100.0
	Total	66	100.0	100.0	

SE1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	3	4.5	4.5	4.5
	1.0	1	1.5	1.5	6.1
	4.0	1	1.5	1.5	7.6
	5.0	1	1.5	1.5	9.1
	6.0	3	4.5	4.5	13.6
	7.0	12	18.2	18.2	31.8
	8.0	15	22.7	22.7	54.5
	9.0	14	21.2	21.2	75.8

	10.0	16	24.2	24.2	100.0
	Total	66	100.0	100.0	

SE2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	5	7.6	7.6	7.6
	1.0	1	1.5	1.5	9.1
	4.0	2	3.0	3.0	12.1
	5.0	6	9.1	9.1	21.2
	6.0	8	12.1	12.1	33.3
	7.0	9	13.6	13.6	47.0
	8.0	17	25.8	25.8	72.7
	9.0	10	15.2	15.2	87.9
	10.0	8	12.1	12.1	100.0
	Total	66	100.0	100.0	

SE3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	7	10.6	10.6	10.6
	1.0	1	1.5	1.5	12.1
	2.0	1	1.5	1.5	13.6
	3.0	1	1.5	1.5	15.2

	4.0	1	1.5	1.5	16.7
	5.0	4	6.1	6.1	22.7
	6.0	7	10.6	10.6	33.3
	7.0	6	9.1	9.1	42.4
	8.0	9	13.6	13.6	56.1
	9.0	10	15.2	15.2	71.2
	10.0	19	28.8	28.8	100.0
	Total	66	100.0	100.0	

SE4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	4	6.1	6.1	6.1
	4.0	1	1.5	1.5	7.6
	5.0	4	6.1	6.1	13.6
	6.0	7	10.6	10.6	24.2
	7.0	6	9.1	9.1	33.3
	8.0	15	22.7	22.7	56.1
	9.0	12	18.2	18.2	74.2
	10.0	17	25.8	25.8	100.0
	Total	66	100.0	100.0	

SE5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	3	4.5	4.5	4.5
	1.0	1	1.5	1.5	6.1
	4.0	2	3.0	3.0	9.1
	5.0	3	4.5	4.5	13.6
	6.0	2	3.0	3.0	16.7
	7.0	4	6.1	6.1	22.7
	8.0	6	9.1	9.1	31.8
	9.0	9	13.6	13.6	45.5
	10.0	36	54.5	54.5	100.0
	Total	66	100.0	100.0	

SE6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	2	3.0	3.0	3.0
	4.0	1	1.5	1.5	4.5
	5.0	3	4.5	4.5	9.1
	6.0	7	10.6	10.6	19.7
	7.0	3	4.5	4.5	24.2
	8.0	8	12.1	12.1	36.4
	9.0	6	9.1	9.1	45.5

	10.0	36	54.5	54.5	100.0
	Total	66	100.0	100.0	

SE7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	4	6.1	6.1	6.1
	2.0	1	1.5	1.5	7.6
	4.0	1	1.5	1.5	9.1
	5.0	5	7.6	7.6	16.7
	6.0	2	3.0	3.0	19.7
	7.0	4	6.1	6.1	25.8
	8.0	9	13.6	13.6	39.4
	9.0	15	22.7	22.7	62.1
	10.0	25	37.9	37.9	100.0
	Total	66	100.0	100.0	

SE8

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	7	10.6	10.6	10.6
	1.0	1	1.5	1.5	12.1

	3.0	4	6.1	6.1	18.2
	4.0	3	4.5	4.5	22.7
	5.0	2	3.0	3.0	25.8
	6.0	5	7.6	7.6	33.3
	7.0	7	10.6	10.6	43.9
	8.0	13	19.7	19.7	63.6
	9.0	12	18.2	18.2	81.8
	10.0	12	18.2	18.2	100.0
	Total	66	100.0	100.0	

SE9

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	3	4.5	4.5	4.5
	4.0	1	1.5	1.5	6.1
	5.0	4	6.1	6.1	12.1
	6.0	6	9.1	9.1	21.2
	7.0	2	3.0	3.0	24.2
	8.0	8	12.1	12.1	36.4
	9.0	10	15.2	15.2	51.5
	10.0	32	48.5	48.5	100.0
	Total	66	100.0	100.0	

SE10

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.0	6	9.1	9.1	9.1
	3.0	1	1.5	1.5	10.6
	5.0	1	1.5	1.5	12.1
	6.0	2	3.0	3.0	15.2
	7.0	2	3.0	3.0	18.2
	8.0	13	19.7	19.7	37.9
	9.0	13	19.7	19.7	57.6
	10.0	28	42.4	42.4	100.0
	Total	66	100.0	100.0	

11. APPENDIX 4 - Cronbach's Alpha Item-Total Statistics

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TD1	275.82	2324.019	.619	.798	.953
TD2	276.10	2328.542	.598	.936	.953
TD3	276.05	2316.366	.725	.946	.953
TD4	275.77	2372.971	.315	.947	.954
TD5	275.88	2370.447	.336	.948	.954
FI1	276.16	2322.528	.588	.906	.953
FI2	275.51	2320.122	.721	.923	.953
FI3	275.51	2308.832	.788	.934	.952
FI4	277.43	2425.748	-.035	.840	.955
FI5	276.23	2328.550	.595	.820	.953
HE1	275.55	2303.699	.713	.953	.953
HE2	275.55	2296.725	.739	.951	.952
HE3	275.26	2316.958	.711	.963	.953
HE4	278.22	2489.411	-.431	.922	.957
CO1	275.43	2324.380	.746	.904	.953
CO2	278.30	2441.370	-.134	.799	.956
CO3	275.74	2329.247	.693	.880	.953
CU1	275.09	2346.663	.573	.882	.953

CU2	275.18	2333.361	.662	.948	.953
CU3	275.39	2317.794	.704	.950	.953
PE1	275.18	2339.651	.536	.931	.953
PE2	275.40	2311.481	.740	.948	.953
PE3	275.09	2319.794	.717	.973	.953
PE4	275.32	2309.906	.689	.946	.953
PU1	275.00	2324.026	.745	.969	.953
PU2	275.17	2322.774	.723	.962	.953
PU3	274.90	2330.568	.677	.930	.953
PIIT1	274.90	2374.726	.473	.902	.954
PIIT2	278.44	2415.013	.033	.802	.956
PIIT3	275.40	2373.586	.336	.887	.954
PIIT4	274.79	2376.588	.425	.874	.954

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