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Technology Acceptance of Business Intelligence and Customer Relationship Management Systems within Institutions Operating in Capital Markets

Ferdi Sönmez

Faculty of Engineering & Architecture, Istanbul Arel University, Turkey

Abstract

Business intelligence (BI) and Customer Relationship Management (CRM) projects are difficult to maintain and manage, since they consist of different systems that need to work together in a collaborative manner. For example, inaccurate data from one location can cause most reports to be generated incorrectly, which in turn can cause meaningless results. This situation may result in the failure of BI and CRM systems. This is most likely due to the fact that the process is not planned correctly and needs are not adequately analyzed. For this reason, systems must always be checked and maintained. Additionally, users' acceptance of this new technology must be examined. In this study, techniques of using BI applications in CRM were examined. While previous studies on the adoption of BI and CRM systems in businesses have used TAM or variants formed from the variables of different theoretical models, in this study an alternative model was proposed based on the Technology Acceptance Model 3 (TAM3), which is an extended form of the TAM's social impact processes and cognitive impact process variables. Thus, this study aims to fill in the gap in the literature and provide a detailed explanation. In order to investigate users' acceptance of BI and CRM systems, an adapted questionnaire was administered to 90 employees at institutions operating in capital markets. Findings showed that by order of importance perceived usefulness, perceived ease of use and behavioral intention to use are the key constructs for promoting the usage of BI and CRM systems in such sectoral context. Besides this, the author offered suggestions to technology managers and institutions operating in the capital markets concerning new technology, adoption of BI and CRM systems under similar sectoral circumstances.

Keywords: Business intelligence systems, Customer Relationship Management, Technology Acceptance Model 3, Acceptance and use of BI and CRM Systems, Capital Markets.

Introduction

In today's competitive economy, businesses are adopting a customer relationship management strategy that centers on customer organization, as they are becoming more aware of the importance of the customer-focused approach (Lindič, & da Silva, 2011). In addition,

businesses have found that acquiring new customers is more costly than retaining existing profitable customers (Shiau, & Chau, 2012; Trainor, et al, 2014). The key to keeping customers is customer satisfaction. Businesses can only provide customer satisfaction if they can identify and meet customer expectations and requests (Trainor, et al, 2014). The most cautious way to follow and appropriately affect changes in customer behavior in this rapidly changing world of customer expectations and wants is to be in constant contact with customers (Lindič, & da Silva, 2011). In this context, businesses are implementing a customer relationship management strategy to establish specific and long-term relationships with customers as a requirement (Sophonthummapharn, 2008). Customer Relationship Management (CRM) systems deal operationally and analytically with the relationships that are required to be continuously maintained with customers (Trainor, et al, 2014; Inci, 2017). Operational CRM basically supports the overall automation of business processes, including the sales, marketing and service of products. Operational CRM applications mainly include "marketing automation", "sales automation" and "service automation" applications (Ranjan, & Bhatnagar, 2011). However, the most important issue that needs to be addressed here is the marketing of functionality. Functional sales, which can increase the incomes of the companies, are only be realized as a result of good marketing. Analytical CRM systems comprise the information management processes related to the collection, accumulation and analysis of customer information gathered from the interfaces (Ranjan, & Bhatnagar, 2011). Within the analytical CRM data warehouse, marketing strategies for the client are determined from the reports obtained after the analysis of customer profiles, operations and needs (Lindič, & da Silva, 2011). These knowledge management processes support the strategy development process by improving the customer strategy, assisting in the value creation process and informing the customer about the characteristics of the market that can be used to develop new products and services in terms of lifetime value (Ranjan, & Bhatnagar, 2011; Hasanian, et al, 2015). In analytical CRM systems, businesses can analyze customer transactions in detail and obtain meaningful statistics that enable them to understand their behavior (Hasanian, et al, 2015). These statistics, along with those who have powerfull effect on corporate decision-making, are delivered immediately to all major units of the company (Ranjan, & Bhatnagar, 2011). Thus, business managers can make decisions that are more effective by using this information. The data held for the businesses and the information generated by the processing of this data are of great importance in terms of understanding the business situation, performance and future of the business, strengthening relations with customers and solution partners, and improving their operations (Hasanian, et al, 2015).

Business intelligence (BI) is a repository of all data inside and outside the business). All departments use the same repository data and write the same date after updating the data. Information discrepancies between sections are also prevented. BI is quickly becoming widespread thanks to the innovations it has provided to businesses (Popovič, et al, 2012). The scope of BI can be broad or limited depending on the needs of organizations. The number of users and the sections used may vary (Popovič, et al, 2012; Elbashir, et al, 2008). Another characteristic of BI is the ability to analyze and interpret the data so that the information can be created. It uses decision support tools such as questioning, reporting and multidimensional analysis. The resulting information is presented to the user with detailed or summarized reports. Using a single database and architecture, users have the ability to create reports in any way they

want (Elbashir et al, 2008). BI report formats vary from cells to charts, from charts to a wide variety of charts (Popovič, et al, 2012; Cosic, et al, 2012). The resulting information can be securely transferred to all administrators, business partners, and information users over the Internet. In this way, the business strengthens the internal and external communication and becomes open to continuous development (Ghazanfari, et al, 2011; Chen, et al, 2012). The manager can display the performance of the operator according to the desired criterion (Ghazanfari, et al, 2011). On this basis, we tried to combine the impact factors of CRM with those of BI systems to show the user acceptance of BI in CRM. Given the characteristics of BI and CRM systems, this study aims to investigate the drivers of user acceptance of BI and CRM systems. While previous studies on the adoption of BI and CRM systems in businesses have used TAM or variants formed from the variables of different theoretical models, in this study an alternative model is proposed based on the Technology Acceptance Model 3 (TAM3), which is an extended form of the TAM's social impact processes and cognitive impact process variables. The use and acceptance of BI in CRM will be examined with TAM3. As an application example, institutions operating in capital markets in Istanbul and using BI in CRM services were discussed.

The study was organized as follows. First, existing studies are included in the field of BI and CRM systems. Section 3 discusses the significance of TAM and precisely TAM3 constituting theoretical background. Then, Section 4 discusses influence factors for the utilization of BI and CRM systems. In the next section, section 5, stages of the methodology followed including development of survey instrumentation/development, research design, sample data collection, and procedure and statistical analysis are presented. The results and findings of the research on the model proposed are presented and discussed in Section 6.

Related Work

Business Intelligence

In the past, both supply and competition were limited, so every product produced was greatly valued (Cosic et al, 2012). In recent years, supply has become more valuable because of the increase in demand and competition (Davis et al, 2012). As a result of this change, product and production planning and analysis of customer requests and needs are at the forefront (Alkanat, 2011). Rapidly developing technology has led to the changeability of customer demands at the same speed. As a result of all this, it is difficult to understand customer trends and very risky to plan long term in this direction, for example, the next two years (Popovič et al, 2012). This is where BI comes into play and provides a continuous change in production plans, in line with the changes in customers' tendencies. This reduction in idle inventory costs means productivity and, most importantly, profitability (Elbashir et al, 2008). Producing according to customer demands alone is not enough to sustain a company, revenue and profits (Lindič, & da Silva, 2011). Only companies that understand the demands correctly can make a difference) in the market environment. Companies that meet the demands and are satisfied with their customers have more say in the market pricing (Trainor et al, 2014).

Basically BI is the whole of the applications and technologies that enable organizations to collect, store and analyze data and access it within certain authorities, plan and determine strategies and make critical management decisions so that they can make faster and more accurate decisions (Popovič et al, 2012; Chen et al, 2012; Alkanat, 2011). The storing and evaluation of knowledge is not just an idea that is present today. The fact that computers now

play a major role in human life has revolutionized the storage of data. Many manual processes were automated. Automation systems have increased the accuracy rates in calculations and made transactions faster and more reliable (Popovič et al, 2012; Ghazanfari et al, 2011). The data held for the businesses and the information generated by the processing of this data are of great importance in terms of understanding the business situation, performance and future of the business, strengthening relations with customers and solution partners, and improving their operations (Elbashir et al, 2008; Cosic et al, 2012). BI is a repository of all data inside and outside the business. All departments use the same repository data and write the same date after updating the data. By doing so information discrepancies between departments are avoided. Another characteristic of BI is the ability to analyze and interpret data in order to create information. It uses decision support tools such as questioning, reporting and multi-dimensional analysis (Cosic et al, 2012; Ghazanfari et al, 2011). The resulting information is presented to the user with detailed or summary reports. Using a single database and architecture, users have the ability to create reports in any way they want. Reports of BI vary in a wide range of formats (Elbashir et al, 2008).

Other important features are the reasoning analysis and warning mechanisms. Users may want to know the causes of the problems they notice while looking at daily reports. BI offers a wide range of possibilities to conduct detailed reviews in such cases (Davis et al, 2012). With user friendly interfaces, it is possible to navigate through the data, navigate to the databases, and perform queries to view the data from different perspectives (Ghazanfari et al, 2011). All of this is achieved through the integration of advanced reporting and analysis systems in BI applications (Cosic et al, 2012). Mechanisms can be created to warn users and top managers about any changes in the system (Chen et al, 2012; Davis et al, 2012). A change in the dynamics can be immediately diverted to the person concerned (Chen et al, 2012). For example; a malfunction in the standard operating behavior of production lines can be automatically notified to the person in charge by e-mail or SMS for warning purposes (Popovič et al, 2012; Ghazanfari et al, 2011). BI systems also benefit from estimation algorithms when analyzing data in large quantities. It also helps the business to make plans for the future besides just giving a snapshot (Elbashir et al, 2008).

When looking at BI systems, the following main technologies stand out: Data warehouses, analysis tools and reporting tools (Ghazanfari et al, 2011; Alkanat, 2011). Data warehouses collect data from databases and unstructured sources and integrate them for various analysis. Data mining tools are an example for analysis tools (Chen et al, 2012). These are tools that analyze data and produce results. Reporting tools are tools designed to show detailed or summary information according to the needs of those who are going to use the information (Ghazanfari, et al, 2011).

CRM

In CRM, there are four basic elements: strategy, process, people and technology (Trainor et al, 2014; Inci, 2017). Evaluating these elements together is crucial for the success of customer relationships. Today, CRM applications are spreading rapidly, but very few have been successful (Trainor et al, 2014). Human factors are the main reason for these failures (Zhao et al, 2012). Therefore, businesses should explain to their employees why it is important to apply customer relations in terms of business, customers and the employees themselves, and

employees should be motivated, since the role of employees in ensuring customer satisfaction and fulfillment of commitment is crucial (Zhao et al, 2012).

In CRM, the concepts of customer value, customer lifetime value and customer orientation are closely related. Customer value is the benefit assessment of a product based on the perceptions of what the consumer has achieved with what they obtained (Hasanian et al, 2015). In other words, customer value is the result of comparing the perceived usefulness and expenses of the customer in the presentation of a supplier. Perceived usefulness is a combination of existing physical features, service characteristics, and technical support for a particular situation (Kim, & Ko, 2012; Ishaq, 2012). The customers' lifetime values are the net present value of the customers, the profits they provide to the businesses, the future profit, and the potential that the customers can provide to the businesses, as well as the extra value they can obtain from them (Zhao et al, 2012; Kim, & Ko, 2012). In light of the fact that marketing budgets are limited, the strategy of an operator to focus on different customers with different marketing tools, based on the value expected of the client, helps businesses to earn better revenues from their marketing investments (Huang, 2014). In addition to the emergence of the concept of consumer rights and, the widespread practice of consumers claiming their rights, consumers have also been able to assess products and services offered by producers and providers of products and services (Kim, & Ko, 2012; Huang, 2014). As a result, businesses have now become conscious of the requirement that their productions must be realized by listening to customers, which has led to customer-focused approaches taking the place of the product-oriented understanding (Zhao et al, 2012; Kim, & Ko, 2012). Customer focused approach refers to the degree to which customer information is collected and used by the business unit. In other words, customer focus is the level at which a company can obtain information from the customer, use this information, develop a strategy that can meet customer needs, and sensitively apply this strategy to customers (Martín-de Castro, 2015). In the marketing literature, it is accepted that customer focus is important for companies to survive (Huang, 2014).

The purpose of CRM is to increase customer retention and profitability (Trainor, et al, 2014). Companies are aiming to gain the right customers to sustain the growth of their business and increase its margins (Huang, 2014). Customer retention is to protect profitable and loyal customers while expanding CRM into new channels (Kim, & Ko, 2012). The purpose of increasing customer profitability is to assist the company through rising customer margins by offering the right product at the right time. A pleasant program for customer relationship may build customer loyalty and, as a result, increases the customer's lifetime value (Ishaq, 2012).

CRM is a combination of people, processes, and technology and tries to understand the customers of company (Chen, & Popovich, 2003). Even though a large part of CRM consists of technology, it is a big mistake to see CRM as just technology (Ranjan, & Bhatnagar, 2011). Managing a successful CRM application requires a balanced and integrated approach to people, processes, and technology (Chen, & Popovich, 2003; Alshawi, et al, 2011; Lee, et al, 2016). Vision is a basic requirement for CRM initiatives (Chen, & Popovich, 2003). Hence, every employee should understand the intention and changes that will come with CRM. The restructuring of the customer focused business model requires cultural exchange within the organization and the involvement of all employees. By means of a successful CRM implementation, some jobs will face significant changes (Chen, & Popovich, 2003; Martín-de Castro, 2015; Alshawi et al, 2011). Management must commit to a continuing education and training program throughout the

company. Along with enhancing the skill and knowledge of employees, education increases commitment and motivation, too) (Chen, & Popovich, 2003; Martín-de Castro, 2015; Lee et al, 2016). Although most companies create business processes that directly impact customers (purchasing, payment and use of direct interface processes with customers during use), sometimes the business processes of these companies need to be updated or completely changed as well (Alshawi, et al, 2011; Lee, et al, 2016). These situations arise when there is no connection between customer wishes and business process outcomes. CRM applications take advantage of technology innovations such as collecting and analyzing data related to customer habits, interpreting customer behaviors, developing forecasting models, responding with timely and effective customized communication, and presenting value to products and services to individual customers (Martín-de Castro, 2015; Alshawi et al, 2011).

Theoretical Background

The TAM is the most adopted model for the acceptance and also the use of information technologies (Venkatesh, & Davis, 2000). It was developed to explain and predict users' acceptance of new technology (Mutlu, & Ergeneli, 2012). According to the TAM, inadequate user acceptance is an obstacle in the acceptance of information technologies (Venkatesh et al, 2012). The TAM is regarded as a strong model established by specifying the least possible number of relationships (Venkatesh, & Davis, 2000). According to the TAM, the user considers the technology in two main dimensions as perceived usefulness (relative advantage) and perceived ease of use (complexity) (Giovannini et al, 2015). Relative advantage is considered as both a dependent and independent variable. It also predicts the intended use and usage, since it is estimated by the complexity (Giovannini et al, 2015). According to the TAM, beliefs about technology are also influencing the users). In TAM, attitude and intention play an important role in accepting technological innovation. Relative advantage and complexity determine attitude and intention. TAM was later developed and user attributes such as subjective norms and attitudes were added (Venkatesh, et al, 2012). The main factors affecting user acceptance in the TAM are perceived usefulness (PU) and perceived ease of use (PEOU) (Martins, et al, 2014).

Venkatesh et al. extended the model by adding new factors that may affect the PU and intention to use variables of TAM (Venkatesh, & Davis, 2000; Calisir, et al, 2009). This new model is called the Extended Technology Acceptance Model. The variables thought to influence PU in the Extended TAM (or TAM-2) are divided into two as social effects and cognitive aids (Venkatesh, & Davis, 2000). Variables related to social impacts (subjective norms, volunteerism and image) and cognitive aids (work relation, output quality, outcome, perceived ease of use) are defined in TAM-2. The relationship between subjective norms and intention to use was based on the relationship between the Theory of Thought Action and the Theory of Planned Behavior. The subjective norm is the indicator of the demands and efforts of the individual to perform an action. In the Extended TAM subjective norms are thought to have a positive effect on PU (relative advantage) (Venkatesh, & Davis, 2000; Calisir et al, 2009). If the user believes that an important person has the idea that it would be useful to use the system, then this belief may cause a perception that the system is actually useful. As a result of the PU, the user may want to use the system.

PU is the degree of belief that the user will increase the performance of this technology

while using the technology involved (Davis, & Venkatesh, 2004). People's prejudice, anxiety and possession of preliminary information have been found to affect PU and PEOU. Anxiety is defined as fear, shyness, and hope that people feel when they think about or use a computer (Venkatesh, et al, 2003). This concern can be exhibited in the form of excessive shyness in computer use, negative comments against computers, attempting to reduce the time spent on a computer, and even avoiding computers where they are located.

Venkatesh and Bala extended the TAM-2 with an organizational point of view and developed the TAM-3 (Venkatesh, & Bala, 2008; Özbek, et al, 2014). People who develop and prepare technology should be aware of the potential needs of the users. In addition, they should be able to direct the users' perception of technology to the targeted point (Holden, & Rada, 2011). Compliance with technology through PEOU is getting more efficient. It has been shown that PEOU has more influence than PU on attitude (Martins et al, 2014; Venkatesh, & Bala, 2008). External factors for PEOU such as benefits, educational beliefs, field knowledge, personal computer experience are important (Martins, et al, 2014; Holden, & Rada, 2011). In a study by Davis and Venkatesh, the scales developed for PU and PEOU were based on the following themes: faster work, work performance, productivity increase, efficiency, easy to understand and clear, easy to transform, controllable and flexible (Davis, & Venkatesh, 2004). Intention is an indication of how much people are willing to perform an action or how much effort they are planning to make. Intention is in the center of the theory of logical behavior (Davis, & Venkatesh, 2004; Holden, & Rada, 2011; Mutlu, & Ergeneli, 2012; Özbek et al, 2014). Intention can be turned into behavior if the person only has behavioral control, in other words he or she can decide to perform or not to perform the behavior. The relationship between PEOU and intention to use is strongly significant. In many studies, there is a strong correlation between these two variables (Martins et al, 2014; Venkatesh, & Bala, 2008). According to the TAM, PEOU is also influenced by PU (Davis, & Venkatesh, 2004; Martins et al, 2014; Venkatesh et al, 2003; Özbek et al, 2014). The conversion into intentional behavior depends on the possibilities and resources (time, money, ability etc.) (Muthu et al, 2016) (Mutlu, & Ergeneli, 2012). Output Quality is the degree to which one believes that someone will do better with the system in use (Holden, & Rada, 2011; Jackson et al, 2013). During certain processes of rich communication, a convergence in the understanding among two roles directly promotes organizational innovation (Muthu, et al, 2016). In this research, convergence is observed. In the context of this research, trust has been seen as another important factor and defined as the extent to which people expect a novel technology to be credible and reliable (Muthu, et al, 2016; Kohnke, et al, 2011). Job relevance, another variable, is the perception or belief of the individual on the degree of target system's applicability to his/her job (Holden, & Rada, 2011). Result demonstrability, is the degree of an individual's belief on the results of using the system as being observable, tangible and communicable (Jackson et al, 2013; Grublješič, & Jaklič, 2015).

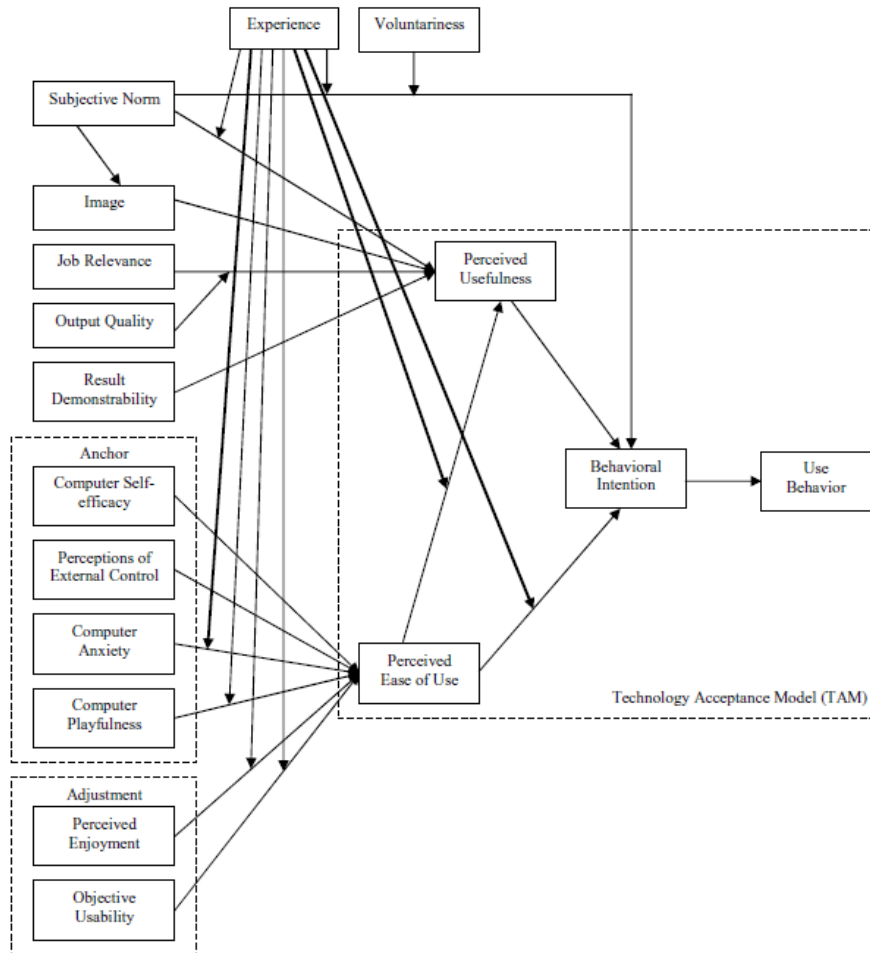


Fig. 1: TAM 3 for BI and CRM systems (Venkatesh, & Bala, 2008)

The main difference in this model is that it has been developed for organizations with the aim of assisting managers in making managerial decisions regarding IT applications (Calisir et al, 2009; Jackson, et al, 2013; Muthu, et al, 2016). In other words, the TAM-3 tries to explain the interventions that can be done by the administrators for more acceptance and more effective use of IT in the company (Venkatesh, & Bala, 2008; Özbek, et al, 2014; Muthu, et al, 2016; Dutot, 2015). This model is presented in Fig. 1. When the design implications and the applicability of BI and CRM systems are examined, the TAM-3 is accepted as the most suitable model for clarifying the employment of such services (Venkatesh, & Bala, 2008; Muthu, et al, 2016; Kohnke, et al, 2011).

Influence Factors for the Utilization of Business Intelligence and Crm Systems

In this study, I considered developing a model to show the effect of institutions, technology, users and governance factors in the users’ acceptance of BI and CRM systems (Phan, & Vogel, 2010). In various empirical studies on the acceptance of technology, it has been shown that no model can make more precise explanations or estimations of user behavior than theoretical models (Kohnke et al, 2011; Dutot, 2015). Findings vary according to these studies that measure

the intention to use in terms of both technology usage and accepted technology adoption models (Dutot, 2015). In this study, a new model was put forward by considering various technology acceptance models. The reason for the preference of the mentioned variables, the adoption and diffusion models of technology, and the critical success factors of BI and CRM were studied in detail and it was determined that these variables are critical variables in technology adoption and adaptation (Phan, & Vogel, 2010; Liu et al, 2010). PU, PEOU, and SN (Bu kisaltmanın açılımı verilmemiş?) variables were preferred because they have proven to- have effects on acceptance and technology usage in the studies on technology acceptance models (Calisir et al, 2009; Muthu et al, 2016; Kohnke et al, 2011; Stein et al, 2013).

As it is clear from the above explanations the main purpose of this study was to create a model with a high degree explanation of technology acceptance of BI and CRM systems by ensuring that variables thought to be effective in acceptance are involved (Calisir et al, 2009; Phan, & Vogel, 2010; Stein et al, 2013; Ranjan, & Bhatnagar, 2011). The model's exit point is the TAM. The TAM has become the most debated and focused model in terms of user behavior and system use in technology acceptance (Kohnke et al, 2011; Dutot, 2015). While the TAM helps to understand and explain user behavior in information technology practices, it is useful to develop a social model by adding relevant factors (Liu et al, 2010; Lee, 2010). Instead of the complexity variable, the perceived ease of use, which is inversely related, was included in the model. The convergence variable was added under the dimension of technological features (Phan, & Vogel, 2010; Liu et al, 2010; Giovannini et al, 2015). The "convergence" variable is important because BI and CRM systems are comprehensive projects that can lead to changes in the way business is done in the organization, enabling many actors (top management, users, project teams, software developers, implementers, etc.) to coexist (Muthu et al, 2016; Kohnke et al, 2011). On the other hand, getting the maximum benefit from the BI and CRM systems that have to be used to fulfill the tasks depends on how easily the user approaches the use of the BI and CRM systems which was measured by adding the "anxiety" variable to the model (Venkatesh, & Bala, 2008; Stein et al, 2013). Likewise, the "intention to use" variable in the TAM is meaningful in the sense that there is no obligation to use, and that the use of technology is shaped by personal or institutional preference (Liu et al, 2010). Here, the BI and CRM systems that are exemplified are the systems in this scope. Fig. 2 shows the research model proposed.

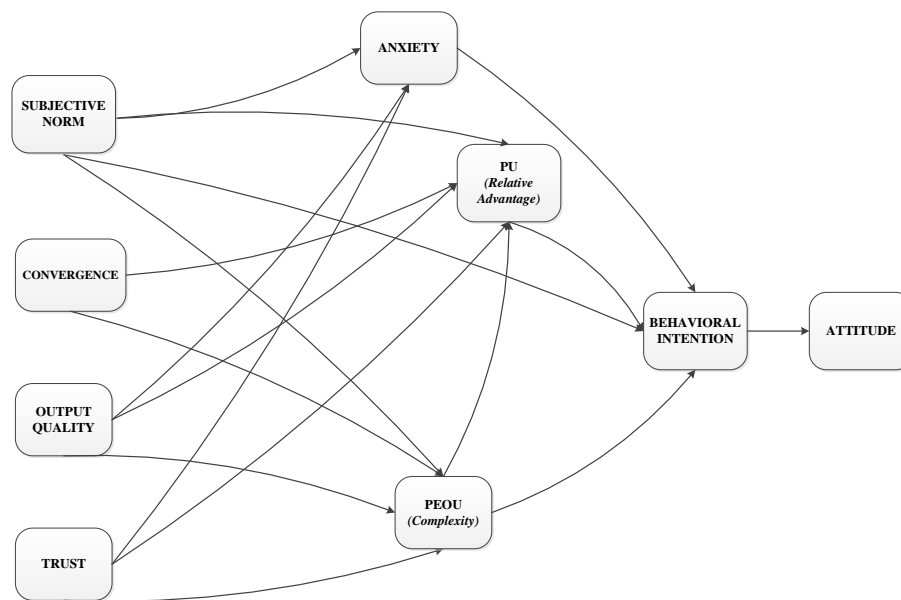


Fig. 2: Research model

In accordance to the model proposed, the acceptance factors will be categorized as Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention (INT), Output Quality (OQ), Anxiety (AX), Subjective Norms (SN), Trust (TR), and Convergence (CON).

Methodology

The methodology presented within this study will be administered in several stages including development of survey instrumentation/development, research design, sample data collection, and procedure and statistical analysis.

Survey Development

Previous research from information systems theory was used to measure constructs which are used to explore the underlying factors of BI and CRM systems' usage within the business organizations (Venkatesh et al, 2003; Calisir et al, 2009; Venkatesh, & Bala, 2008; Phan, & Vogel, 2010; Pierre, 2012; Stein et al, 2013; Alharbi, & Drew, 2014; Esgin, 2015; Grublješiči, & Jaklič, 2015). The intention of this study was to include real world professionals who currently use or have recently used BI and CRM systems in the workplace (Stein et al, 2013; Ranjan, & Bhatnagar, 2011). The research methods referenced provide data collection through measurements, survey instruments, and documents. Factors such as PEOU, PU, behavioral intentions, attitude toward using have been used extensively throughout the body of research and have been found to be both valid and reliable (Liu et al, 2010; Morosan, 2012).

Measurements are assembled from survey instruments/questionnaires among users of BI and CRM systems from various institutions and companies in the capital markets in Turkey. Instruments obtained from relevant literature were used to provide validation to this study (Venkatesh et al, 2003; Venkatesh, & Bala, 2008; Calisir et al, 2009; Phan, & Vogel, 2010; Liu et al, 2010; Morosan, 2012; Grublješiči, & Jaklič, 2015). The Likert scale, which measures the

degree to which a user participates in or does not participate in an object, an attitude or an expression presented to him in a behavior, was used (Calisir et al, 2009; Morosan, 2012; Esgin, 2015; Gunay, & Sonmez, 2017). The measurement of theoretical constructs were rated along a six point Likert-type scale, ranging from 1 (very strongly disagree) to 5 (very strongly agree) and 6 (No idea) (Gunay, & Sonmez, 2017). The measures determined (see Tab. 2) are expected to provide an empirical perception of the overall use of BI and CRM systems. Equally significant within this study was the determination of the capacity of the individual to accept and use BI and CRM systems to achieve organizational objectives (Phan, & Vogel, 2010; Grublješiči, & Jaklič, 2015).

There are 8 sub-dimensions in the research. Demographic characteristics (Table 1) were included in the questionnaire created according to the determined variables.

Table 1: Items for Demographic Characteristics Information

Section I: Demographic Characteristics Information
Your age:___
Your Gender: () Female () Male
Level of Education:
() Primary School () Secondary School () High School () Associate () Undergraduate () Graduate () PhD
How many years have you been working for this organization:_____
On average, how many hours a day do you use a computer (including a tablet)?
() 0-1 Hours () 1-2 Hours () 2-3 Hours () 3-5 Hours () 5-7 Hours () More than 7 Hours
On average, how many hours per day do you use the internet?
() 0-1 Hours () 1-2 Hours () 2-3 Hours () 3-5 Hours () 5-7 Hours () More than 7 Hours
How often do you log into BI and CRM systems?
() Every Day- Several Times () Every Day - Once () Every Other Day () Two or Three Times a Week
What is your job title? _____
When you log in to BI and CRM systems, what is your average time of usage?
() 0-15 Minutes () 15-30 Minutes () 30-45 Minutes () 45-60 Minutes () More than 60 Minutes

A favored response in questioners is "No idea". Thus participants were encouraged to elaborate (Gunay, & Sonmez, 2017). The questions were prepared in a way that would not pressurize the participants answering the questionnaire and allow room for interpretation. There were 41 items suggested in 8 sub-dimensions. It was aimed to determine the density of acceptance with the grading made between "absolutely agree" and "absolutely do not agree" to the given proposals (Table 2). The scale sub-dimensions are:

- Perceived Usefulness
- Perceived Ease of Use
- Behavioral Intention to Use

- Output Quality
- Anxiety
- Subjective Norms
- Trust
- Convergence

Table 2: Scale Items

Perceived Usefulness – 11 items
BI and CRM systems enhance business management or paper management.
BI and CRM systems increase the quality of work I do.
BI and CRM systems allow me to have more control over my work.
The quality of the business I get from the BI and CRM systems is high.
BI and CRM systems support important elements for business.
Using BI and CRM systems increases productivity at work.
Using BI and CRM systems increases my performance at work.
Using BI and CRM systems increases the efficiency at work.
BI and CRM systems provide more accurate and timely data on decision making.
BI and CRM systems allow me to do tasks more correctly.
In general, BI and CRM systems are useful in my work.
Perceived Ease of Use – 7 items
I think it's easy to do what I want with the BI and CRM systems.
BI and CRM systems are easy to use.
It is very easy to remember how to perform my tasks using BI and CRM systems.
Interaction with BI and CRM systems do not require much mental effort.
The use of BI and CRM systems are clear and understandable.
Guidance in BI and CRM systems (going where I want to reach) is very easy.
In general, the use of BI and CRM systems is easy.
Behavioral Intention – 4 items
I can use BI and CRM systems to conduct business, research and follow up on my work.
I intend to use BI and CRM systems to the extent possible.
I think that I will use BI and CRM systems wherever I can reach them
I hope that I will use / continue to use BI and CRM systems.
Convergence - 7 items
If more representatives from the company participated in the development of BI and CRM systems, it would make BI and CRM systems more comfortable to use.
I would have preferred to use BI and CRM systems if my or a colleague's views were taken.
I have the resources to use BI and CRM systems.
I would like to switch to BI and CRM systems by getting help from someone who has used them before.
Communication frequency is paramount in the workplace to understand the challenges faced.
Communication richness is paramount in the workplace to understand the challenges faced.
I have the necessary knowledge to use BI and CRM systems.
Output Quality - 4 items
The results of using BI and CRM systems are obvious to me.

I can easily tell the results of using BI and CRM systems to others.
I have difficulty in explaining why using BI and CRM systems can be beneficial.
BI and CRM systems reduce the cost and time of document management and process tracking.
Anxiety - 3 items
I am worried about using BI and CRM systems.
It is frightening to lose too much data by pressing the wrong key while using BI and CRM systems.
I am hesitant to use BI and CRM systems because I'm afraid of making mistakes that I cannot fix.
Subjective Norms - 3 items
People who are important to me in the institution think that I should use BI and CRM systems.
My department manager thinks that I need to use the BI and CRM systems.
My colleagues are encouraging me to use BI and CRM systems.
Trust - 2 items
I am pleased with the results of my work using BI and CRM systems.
I feel comfortable when I use BI and CRM systems.

Data Collection and Analysis

Examination of technology acceptance and use of BI and CRM systems were used for data collection. The proposed TAM measure was prepared using a paper-based and online test. The survey was applied as a questionnaire to the employees of capital market institutions using BI and CRM systems. All participants (employees) in the survey were active users of BI and CRM systems. The survey was conducted and received 108 responses. After removing responses with incomplete or irrelevant data, we had 97 convenient feedbacks. The most prominent job titles of the employees are as follows: Senior Project Manager, Assistant to the Director, Chief Executive Officer, Head of the Information Technology Department, Project Manager for the Information Technology Department, Head of the Commercial and Finance Department, Head of the Securities and Futures Department, Credit Marketing Manager, Portfolio Manager, Credit Allocation Manager. Other job titles of the employees concerning BI and CRM systems implementation ranged from Sponsor of BI and CRM systems project and Key user of BI and CRM systems to BI and CRM systems project leader and BI and CRM systems user.

The level of significance in all statistical procedures used in the study was accepted as 0.05 and all of the results obtained were tested bidirectionally (Altaş, et al, 2013). The statistical process of the study was conducted using IBM SPSS Software.

Research Findings

One of the problems encountered for this research model was how to ascertain the correct number of latent variables that were included within this research. One of the ways the researcher ensured that the proper number of latent variables were included was to observe the correlation coefficient values all of the variables and constructs referenced within the proposed model. The model was refined by eliminating latent variables that fell outside of the range of the confidence level (.05) with their correlated variable (Altaş, et al, 2013).

Table 3: Results of Correlation Analysis

Constructs	1	2	3	4	5	6	7	8
1. Subjective Norm	1							
2. Convergence	.563	1						
3. Output Quality	.588	.189	1					
4. Trust	.594	.141	.518*	1				
5. Anxiety	.459	.170	.522*	.548	1			
6. PU	.722	.612*	.803*	.541	.113	1		
7. PEOU	.512	.442	.505	.635	.124	.526	1	
8. Behavioral Intention to Use	.804*	.434	.616*	.623*	.515	.664*	.502*	1

*p<5

The results of the correlation analysis gave general information about the relationships between the variables. However, a regression analysis was applied to test the relationship between the dependent variable and one or more independent variables, so that it would be useful to verify this with a more advanced analysis (Chatterjee, & Hadi, 2015). Beta values in the regression analysis showed the relative importance of independent variables with respect to dependent variables, p values indicated the significance levels of the variables, and R^2 (expression coefficient) values indicated independence variable and dependent variable explanations. R^2 , which takes values between 0 and 1, provides preliminary information on the adequacy of the number of independent variables and number of observations entering the model (Sonmez, & Bülbül, 2015). Accordingly, it was understood that the number of observations used was sufficient and that variables without significant contributions were not included in the model (Chatterjee, & Hadi, 2015; Loehlin, & Beaujean, 2016).

Table 4: Results of Regression Analysis

Dependent Variable		Standardized Coefficients	t-Value	Significance
PU (Relative Advantage)				
$R^2=.64$	PEOU	.706	12.105	.000
	Convergence	.644	10.102	.000
	Subjective Norm	.603	9.568	.000
	Trust	.413	8.144	.000
	Output Quality	.710	12.298	.000
Behavioral Intention to Use				
$R^2=.58$	PU	.388	3.686	.005
	Anxiety	.141	2.464	.007
	Subjective Norm	.731	12.770	.000
	PEOU	.294	3.554	.005
PEOU (Complexity)				
$R^2=.42$	PU	.569	5.664	.006
	Output Quality	.198	2.158	.008
	Trust	.480	5.142	.000
	Subjective Norm	.554	5.720	.000

The adjusted R^2 value was 0.64 for dependent variable PU. In other words, complexity, convergence, output quality and trust explained PU by 64%. The results implied that the effect of trust ($\beta = .413$, t-value = 8.144), complexity ($\beta = .706$, t-value = 12.105), convergence ($\beta = .644$, t-value = 10.102), subjective norm ($\beta = .603$, t-value = 9.568) and output quality ($\beta = .710$, t-value=12.298) on PU was statistically significant respectively. Accordingly, the variable that had the highest effect on the PU was the output quality.

The adjusted R^2 value was 0.58 for dependent variable behavioral intention to use. In other words, relative advantage, anxiety, subjective norm and complexity explained behavioral intention to use by 58%. The results implied that the effect of PU ($\beta = .388$, t-value = 3.686), anxiety ($\beta = .141$, t-value = 2.464), subjective norm ($\beta = .731$, t-value = 12.770), complexity ($\beta = .294$, t-value = 3.554) on behavioral intention to use was statistically significant respectively. Accordingly, the variable that had the highest effect on the behavioral intention to use was the subjective norm.

The adjusted R^2 value was 0.42 for dependent variable PEOU. In other words, convergence, output quality, trust and subjective norm explained PEOU by 42%. The results implied that the effect of convergence ($\beta = .569$, t-value = 2.664), output quality ($\beta = .148$, t-value = 2.158), trust ($\beta = .480$, t-value = 5.142), subjective norm ($\beta = .554$, t-value = 5.720) on PEOU was statistically significant respectively. Accordingly, the variable that had the highest

effect on the PEOU use was the trust.

According to the results of the study, 58% of the intention to use was explained by the generated model, which is better than most models in the literature (Taylor, & Todd, 1995; Agarwal, & Prasad, 1997; Brown et al, 2002; Yi et al, 2006; Kim et al, 2006; Park, 2009; Goh, 2011; Ashraf et al, 2014; Alharbi, & Drew, 2014; Kansal, 2016; Samar et al, 2017). According to the results, SN explains most of the BIU. This result reveals that the users place special emphasis on the considerations of those who are important to them, for example their colleagues or managers. Employees want to use technology more if they are encouraged to use technology by their social environment. The fact that the SN is very important in this study may be due to the fact that the employees attach great importance to the managers' thoughts to reach the targets set by their managers. Moreover, as in this study, it has been shown in many studies that SN explains BIU better than PEOU and PU (Simon, & Paper, 2007; Grandón et al, 2011; Teo, 2011). Output quality was found to be more significant than PEOU on PU with a small difference, similar to several previous studies (Lin et al, 2011; Kim, & Park, 2012). As mentioned in the TAM, there is a significant relationship between PEOU and PU (Venkatesh, & Bala, 2008). However, the relationship between PEOU and BIU is not significant as TKM mentioned (Venkatesh, & Bala, 2008). There is a significant relationship between PEOU and PU (Venkatesh et al, 2003; Holden, & Rada, 2011).

Conclusion and Future Remarks

Nowadays, most BI and CRM applications fail. This is mostly due to the fact that the process is not planned correctly and needs are not adequately analyzed. Moreover, BI and CRM projects are difficult to maintain and manage because they consist of different systems that need to work together in a collaborative manner. For example, inaccurate data from one location can cause most reports to be generated incorrectly and cause meaningless results. For this reason, systems must always be checked and maintained. While previous studies on the adoption of BI and CRM systems in businesses have used TAM or variants formed from the variables of different theoretical models, in this study an alternative model was proposed based on the Technology Acceptance Model 3 (TAM3), which is an extended form of the TAM's social impact processes and cognitive impact process variables. This proposed model could have several contributions. Firstly, factors that influence acceptance of BI and CRM systems in companies, that already implemented and use some or all modules of integrated information systems, will be examined in order to fill the gap in the literature about BI and CRM systems and providing a detailed explanation. Secondly, current level of usage of BI and CRM systems were measured in institutions operating in capital markets, thus providing new information about the current level of implementation at this dynamic market.

There is a positive relationship between the subjective norm and the intention to use. Moreover, according to the results, subjective norms are the most explanatory variable of behavioral intention to use. In the study, the subjective norm was found to be effective on usage. As the ideas of the individuals, which are considered to be important, have increased in the direction of new technology, the desire of employees to use new technology will also increase. In terms of users, the thoughts of colleagues and managers involved in using technology are very important. If managers think that the BI and CRM systems will improve the performance of the employees, they will also tend to act in this direction, believing the need

to use the system. In order for employees to be motivated to use technology, managers must first appreciate the achievements of using BI and CRM systems and share it with everyone working in the department. Thus, it will be perceived by users that it is appreciated and desired to use this technology.

There is a positive relationship between the subjective norm and the perceived usefulness. Inadequacy of knowledge in relation to innovations creates ambiguity in the opinion of employees. People are trying to learn from those who they think are more experienced in this regard to get rid of this uncertainty. Thus, the information obtained affects the perception that newness will benefit them or that there will be no usefulness. Accordingly, as the people around them increase their positive thoughts on BI and CRM systems, the perception that employees will benefit from this system will also increase. There is a positive relationship between the convergence and the perceived usefulness. The fact that the new systems are compatible with the job and the communication is facilitated will positively affect the performance of the employees and this will increase the perception that the system is beneficial for the employees. During certain processes of rich communication, a convergence in the understanding among two roles directly promotes organizational innovation.

There is a positive relationship between the output quality and PU. Moreover, according to the results, the output quality is the variable that explains the perceived usefulness most. The level of belief that employees will be able to do business better with new technology will lead to the thought that the employees perform well in their job and accordingly the employees will perceive the system as beneficial. There is also a positive relationship between perceived usefulness and behavioral intention to use. Accordingly, as the use of BI and CRM systems become more useful, the intention of the employees to use the system will increase. There is a positive relationship between PEOU and behavioral intention to use. The PEOU of the system is influential in the users' acceptance of the system, which makes the system successful.

There is a positive relationship between PEOU and PU. Believing that the individual will use the existing system without difficulty will create the idea of increasing his/her performance and affect the individual's decision to use new information technology. Accordingly, as more and more users feel that the use of the new technology is easier, the perceptions that users will benefit from the new technology will increase. Technically perfect configuration of the system does not mean that the system will succeed. Successful adoption of the system by the employees is the most important factor that will make the system successful. For example, informing employees about the benefits of using the system for the company will contribute to the long-term benefits, motivate users and help users to become aware of the benefits of the new system. Therefore, this will affect employees' intention to use positively.

In this study, regression analysis was used to reveal the model relationships. In future research, this model can also be tested using different methods. When we look at the models related to technology acceptance, it is seen that the models have a large number of variables and therefore the explanatory ratios are quite high. In this study, we tried to include the variables which are thought to be effective on the adoption of BI and CRM systems technology and which show findings supporting this in the literature. The proposed model contains many variables in user and BI and CRM system dimensions. However, by adding variables that are not included in the model, higher explanatory rates can be obtained. A limitation of the work is that the indirect effects between the variables have not been taken into account to make the model

simpler. If implicit relations between variables are also included in the model, and if indirect effects between the variables in the users' use of BI systems and CRM are also analyzed, more meaningful relations can be found. The usage effects of demographic characteristics have not been studied in this study. The effects of Internet and computer usage time, age, position of employee and level of education can be examined to explain the model. Using collected data in the study, it can be investigated whether the gender factor creates a difference in accepting BI and CRM systems and whether there is a difference between men and women in terms of using technology. As a concluding remark, future research would be more useful with a much larger sample and industry support.

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