BUSINESS INTELLIGENCE CAPABILITIES AND USER SATISFACTION
Case Study Of A Large Global Manufacturing Company

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ABSTRACT

User satisfaction is frequently used as a substitute for measuring of information system effectiveness. An effective system expected to add value to the firm, and further it must have some positive influence on user behavior (i.e., improve productivity, fewer errors, better decision making, etc.). Business Intelligence (BI) capabilities (organizational and technological capabilities) are considered as crucial functionalities that help an organization improve its performance. Previous studies reveal that BI applications are good for providing some of the capabilities like user access, flexibility, and internal and external data reliability. Hence, the main objective of this study is to explore how BI capabilities influence users satisfaction. To achieve the objective of this study an online survey (questionnaire) was run at a large global manufacturing company. The findings of this study show that there exists a significant positive relationship between BI capabilities (organizational and technological capabilities) and user satisfaction. Further, it should be highlighted that the earlier studies have been restricted to small samples, while this study considers of larger sample of user of BI applications. This study aims to contribute to practice by introducing information for managers and users of BI to think about their decision environment when evaluating user satisfaction. Moreover, it produces a framework for future research on the relationship between BI capabilities and user satisfaction.

Keywords: Business Intelligence; BI; BI capabilities, users satisfaction

INTRODUCTION

Information systems have crucial role to solve the problems that are faced by organizations to cope with the current challenges. In this light, it can be claimed that successful information systems identify by certain characteristics or metrics (Bokhari, 2005). During the past ten years, the approach to management business has changed in the whole world and organizations become able across knowledge, data transformation, and modeling the correct information and knowledge. Business intelligence joins as a key strategy for any organization to achieve a competitive advantage (Azma and Mostafapour, 2012). It is argued that BI applications have capability to analyze vast amount of data and provide better and quicker responses to businesses (Isik, et al., 2011; 2010; Elbashir, et al., 2008; Li, et al., 2008).

An information system may therefore be considered successful if it meets criteria such as fulfilling user needs and organizational objectives. At the same time, a range of factors may affect systems during their development and implementation. However, it seems that the evaluation of a system in terms of its success is naturally complicated phenomena (Bokhari, 2005; Hartono, Santhanam and Holsapple, 2007). Measurement of information systems success has always obtained major importance among researchers. Though, evaluation of satisfaction, also assessment of the capabilities of the constructed system depends on various terms such as system performance, effectiveness, quality, use and users' satisfaction. For instance, Miller (1989, p.283) argues that an "effective information system is one that

achieves the purposes of its users".

To allow the operation of the BI process, it is important to consider which capabilities are required (Lönnqvist and pirttimäki, 2006). Capabilities can consist of the available resources such as the BI personnel's competences and the availability of appropriate information technology. BI consists of both technical and organizational components (Waston, et al., 2006) that present historical information to users for analysis, to enable effective decision-making and management support for the overall objective of increasing organizational performance. Companies benefit of BI when they manage their business strategy, they need to consider what strategies satisfy the needs and ensure the contribution of the users identified (Lönnqvist and pirttimäki, 2006). Various organizational characteristics and strategic aims require using different BI capabilities. This deals with choosing of BI capabilities that are related to how achieving the goals of users. However, there are a lot of organizations that still struggle to measure that how BI applications influence the organization's performance, there still remains the lack of understanding of BI capabilities and their impact on user satisfaction (Isik, et al., 2011). It is argued that BI capabilities have ability to improve profitability, increase efficiency and reduce cost (Lönnqvist and pirttimäki, 2006). Measuring the user satisfaction is for example a way to understand various BI capabilities. In This way users think about different aspects of the system such as ease of use, timeliness, flexibility, and access. Thus, it is possible to understand what would be the users' expectations of BI capabilities (Isik, et al., 2011). With an appropriate selection of capabilities, BI can help organization predict changes or recognize competitor's new product quickly and respond by introducing a competing product (Waston and Wixom, 2007).

BI applications have capability to work with different types of data like numerical and non-numerical data, and obviously quality of data is equally important for both types. Relatedly, level of data quality, clean, and relevant data are the most critical factors for organization successfulness (Isik, et al., 2012). Thus, companies BI initiative can make a real difference in regard to organizational successfulness. Moreover, BI has capability to provide and mange both internal and external data, internal data are generally integrated and managed within the traditional BI applications such as data warehouse or an online analytical processing (OLAP), and external data are usually retrieved from spreadsheets, websites, and audio and video files. External data consist of data that organizations exchange with customers, suppliers, and vendors. The quality of these sources can directly affect the effectiveness of the BI applications and satisfaction of its users (Isik, et al., 2012).

The importance of BI capabilities do not conclude merely to data quality and data sources, rather BI has capability to manage different information access mechanisms to provide right users and right accessibility. There are different BI mechanisms with different capabilities that serve different purposes (Isik, et al., 2012). Since, different groups of users need different information for different reporting and analysis, organizations may need to employ different BI tools/mechanisms. BI applications are capable to provide both limited and unlimited access (depends on organizations' preference) to data analysis and reporting tools to all users. For instance, QlikTech, a web-centric BI application that provides analytical and reporting capabilities for all types of users (Havenstein, 2006). Moreover, BI mechanisms provided by Layzasoft Inc. is an all-in-one tool that consists of integrated reporting, ad hoc query and analysis, dashboards, and connectivity to data sources as a client side desktop application

(Swoyer, 2008). It should be considered that technology does not always carry on exceptional conditions, even though organizations require the flexibility and robust functionality to achieve the optimal potential from BI. An information system needs to be flexible; it must be able to adjust a certain number of variations exist in the business processes (Gebauer and Schober, 2006). Interested to know that BI application can provide the required flexibility in the decision-making process (Isik, et al., 2012). However, Gebauer and Schober (2006) mention that too much flexibility may increase difficulty and decrease usability.

Research studies have appraised a range of constructs as success antecedent. These consist of the nature of organizational attitudes and commitment, perceived user friendliness of the system, degree of designer skills, and task characteristics such as degree of problem difficulty supported by the system, level of user experience, level of user participation, level of perceived value, and level of user training (Hartono, Santhanam and Holsapple, 2007)

User training is the important factor in term of achieving better satisfaction of end user. Thus, the organization must focus on providing sufficient user satisfaction. Various research studies on user training have revealed that such training can outstandingly affect user acceptance and utilization of a system (Hartono, Santhanam and Holsapple, 2007). User training helps user to understand and being expert in system use, and then being more comfortable in using the system. This interprets as user being more satisfied with more experience of using the system and output of the system. In addition, management support has also high rates as an antecedent of satisfaction. Where such support is missing user training may be a fatality, the interest or priority for using the system may suffer. Even, users have frequently experienced a disagreement between their own inclination to use the system and management's irrelevance.

Going a step forward conceptually, satisfaction is posited as the consumer's (consumer can be users of a system) fulfillment reaction. It proposed to provide a pleasure level of consumption fulfillment including the level of under or over fulfillment (Deng, et al., 2010). The user satisfaction literature clearly computes system and information design characteristics (e.g., information accuracy and system reliability), building it a possibly useful indicative for system design; however, user satisfaction is a weak predictor of system usage (Wixom and Todd, 2005). Indeed, this refers to the fact that beliefs and attitudes about objects (such as an information system) are mostly poor predictors of behaviors (such as system usage). By contrast, the technology acceptance literature (i.e., the technology acceptance model, or TAM) offers predictions of usage by relating behaviors to attitudes and beliefs (ease of use and usefulness) that are uniform in time, target, and context with the behavior of interest (system usage).

To assess users satisfaction in regard to BI applications, BI usability is an important determinant of user satisfaction and system performance (Isik, et al., 2010). User satisfaction is frequently used as a surrogate measure for BI success. The direct relation between user satisfaction of IS, IS use and decisional or organization effectiveness is the cause of measuring user satisfaction as a surrogate for system successfulness.

Findings suggest that employing suitable technology for supporting decision-making can aid an organization increase its decision-making capabilities (Arnott and Pervan, 2005). For instance, Wixom and Watson (2001) state that the suitability of the technology employed influences the efficiency and effectiveness of the data warehouse execution and usage.

Both organizational and technological BI capabilities are crucial for decision-making in organization; by collecting data, BI capabilities can provide notifications to users and run prognostic analytics to help them make well-informed decisions (Isik, et al., 2010).

However, research shows (Isik, et al., 2011; 2010; Watson and Wixom, 2009) that while BI applications offer different capabilities like qualitative and quantitative data quality, user access, flexibility, and enteral and external data reliability, users believe in capabilities that allow them to deal with uncertainty and change in the environment. Keep it in mind, this study aims to investigate BI capabilities and see how these capabilities influence user satisfaction. Accordingly, the research question below is conducted to achieve the objective of this study.

How do BI capabilities influence user satisfaction?

The result of this study is relevant for both researchers and practitioners. It will positively improve and enhance management performance. Furthermore, it contributes to practice by introducing information for managers and users of BI applications to think about their decision environment. The study will provide richer insight in the role of BI capabilities and their link with user satisfaction. In the future studies, users perceived benefits, system development characteristics, management support, user training and participation; organizational characteristics should be more closely examined, because they seem to be more ancestors.

PRECURSORY FINDINGS

Previous studies indicate that BI applications generate a wide range of benefits such as time saving for users, improvement of business processes, support for accomplishment of strategic business objectives, better decision, more and better information, time saving for data suppliers, and cost savings for data mart consolidation (Wixom and Watson, 2009).

Users are satisfied with overall and different aspects of BI applications. It seems that it is difficult to find significant differences in the level of satisfaction among different users in different industries (Isik, et al., 2012). It is claimed that experience has significant role among users who use BI systems. Users with more experience of BI applications are more satisfied than those are less experienced.

Various studies consistently point to a high level cohesion among successful BI implementations. They claim, organizations that are successful with their BI are those that created a strategic approach to their BI systems. This ensures that BI is stable with corporate business objectives. Relatively, Watson, et al. (2006) point out the Continental Airlines improved its processes and profits through BI capabilities and became successful with the implementation of BI. Furthermore, Malone (2005) refers to cardinal Health Care as a good succeed example, this organization is also benefited of BI capabilities concerning its business requirements.

Clark, et al. (2007) and Hartono, et al. (2007) are also indicated several success model for management support systems through BI capabilities. They mention that it is quite important to understand BI capabilities and their influence of the decision environment in which BI is used.

In term of user Satisfaction, it would be a feeling more than simply meeting the users' expectations about task/goal achievement (Oliver, 1997). Indeed, the terms disconfirmation of expectations and over-fulfillment drive to high level of satisfaction (Oliver and Wayne, 1988). Oliver and Wayne (1988) believe that high levels of user satisfaction might be found in an information technology which entertains user by understanding their expectations and allowing them to experience something more than simple task/goal achievement, for example, desire, enjoyment, and authorization or permission. Therefor, this needs to concentrate on user experience, which underlines arrangement, fun, and pleasure rather than only functionality or ease-of-use (Wright, et al., 2001; Marcus, 2002). This description says that satisfaction is a pleasurable response that rising from an assessment with respective to how fit the consumption of a product or service meets a need, desire, or goal.

Tessier, Crouch, and Atherton (1977) stated that satisfaction was "ultimately a state experienced inside the user's head" (p. 383) and therefore was a response that "may be both intellectual and emotional" (p. 384).

User satisfaction considers as a subjective variable, which can be influenced by several factors such as system effectiveness, user effectiveness, user effort, and user characteristics

and expectations. To measure and achieve user satisfaction these factors should be considered. (Al-Maskari and Sanderson, 2010).

Spärck Jones (1981, p. 55) stresses the importance of user satisfaction, which cannot be ignored in any experiment. User satisfaction has the following advantages such as it focuses on multidimensional evaluation of the interactive processes, and it also identifies user and request characteristics as among possible influencing factors in user evaluation (Su, 1992).

However, Belkin and Vickery (1985) warned, like Tessier, et al. (1977) before them, of the various problems allied with satisfaction criteria. These problems occurred from the ambiguous definition of "satisfaction" and how to measure it.

However, in this study user satisfaction measures by examining technological and organization BI capabilities. Technological capabilities consider of data quality, functionality, access, and flexibility; also organizational capabilities consider of training, support, and type of use. BI capabilities adapted from Isik, et al., (2012).

Research Model And Hypothesis

User satisfaction has been studied for long time from different perspectives; however, there are no studies that examined it from BI capabilities perspective. Therefore this study investigates user satisfaction from a BI capabilities point of view. This study examines how different technical and organizational capabilities impact on user satisfaction in an organization. By investigating different capabilities, it supposed to make the decisions (effective decisions) being easier for decision makers and users. This study shows that there is positive relation between BI capabilities and user satisfaction. Below figure 1 provide the conceptual model.
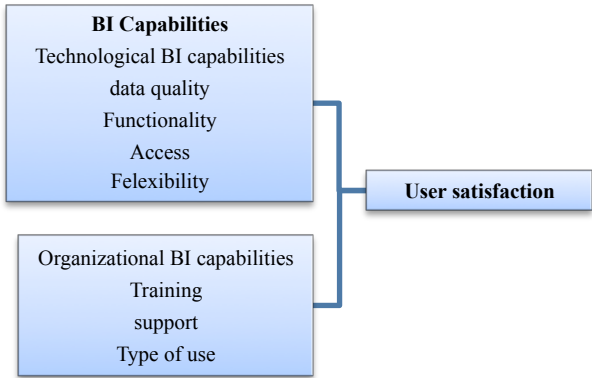

Figure 1, Conceptual model

Technological capabilities are considered as crucial factors for any IS (Waston and Wixom, 2007). An effective substructure, high quality of data, and comprehensive factors can influence user satisfaction. As well as organizational capabilities, which define as both process and product, it uses to improve useful information for helping organizations survive

in the global economy and predicting the behavior of the general business environment. Organizational BI capabilities are resources for the effective application of IS in organization (Isik, et al., 2010). These are considered as resource intensive training, the quality of support, and the type of use, in this study. Following conducted hypotheses based on the above discussion.

Hypothesis

Technical BI capabilities (Data quality, Functionality, Access, Flexibility)	
H1a	The higher the data quality, the higher the satisfaction
H1b	The higher the access, the higher the satisfaction
H1c	The higher the functionality, the higher the satisfaction
H1d	The higher the flexibility, the higher the satisfaction
Organizational BI capabilities (Training, Support, Type of use)	
H2a	The more resource intensive training, the higher the satisfaction
H2b	The higher the quality of support, the higher the satisfaction
H2c	The higher the sophistication of use, the lower the satisfaction

BI applications have capability to work with different types of data like numerical and non-numerical data, and obviously quality of data is equally important for both types. Relatedly, level of data quality, clean, and relevant data are the most critical factors for organization successfulness (Isik, et al., 2012). Thus, companies BI initiative can make a real difference in regard to organizational successfulness. Moreover, BI has capability to provide and mange both internal and external data, internal data are generally integrated and managed within the traditional BI applications such as data warehouse or an online analytical processing (OLAP), and external data are usually retrieved from spreadsheets, websites, and audio and video files. External data consist of data that organizations exchange with customers, suppliers, and vendors. However, the data is internal or external, the quality of these sources can directly affect the effectiveness of the BI applications and satisfaction of its users (Isik, et al., 2012). Therefore, the following is hypothesized:

H1a: The higher the data quality, the higher the satisfaction

The importance of BI capabilities do not conclude merely to data quality and data sources, rather BI has capability to manage different information access mechanisms to provide right users and right accessibility. There are different BI mechanisms with different capabilities that serve different purposes (Isik, et al., 2012). Since, different groups of users need different information for different reporting and analysis, organizations may need to employ different

BI tools/mechanisms. BI applications are capable to provide both limited and unlimited access (depends on organizations' preference) to data analysis and reporting tools to all users. For instance, QlikTech, a web-centric BI application that provides analytical and reporting capabilities for all types of users (Havenstein, 2006). Moreover, BI mechanisms provided by Layzasoft Inc. is an all-in-one tool that consists of integrated reporting, ad hoc query and analysis, dashboards, and connectivity to data sources as a client side desktop application (Swoyer, 2008). Thus, the access to data is really important for users regardless the type of system provided the information. Following, is hypothesized:

H1b: The higher the access, the higher the satisfaction

Moreover, it should be considered that technology does not always carry on exceptional conditions, even though organizations require the flexibility and robust functionality to achieve the optimal potential from their BI applications. An information system needs to be flexible; it must be able to adjust a certain number of variations exist in the business processes (Gebauer and Schober, 2006). Interested to know that BI applications can provide the required flexibility in the decision-making process (Isik, et al., 2012). However, Gebauer and Schober (2006) mention that too much flexibility may increase difficulty and decrease usability. Accordingly, the following is hypothesized:

H1c: The higher the functionality, the higher the satisfaction
H1d: The higher the flexibility, the higher the satisfaction

Research studies have appraised a range of constructs as success antecedent. These consist of the nature of organizational attitudes and commitment, perceived user friendliness of the system, degree of designer skills, and task characteristics such as degree of problem difficulty supported by the system, level of user experience, level of user participation, level of perceived value, and level of user training (Hartono, Santhanam and Holsapple, 2007)

User training is the important factor in term of achieving better satisfaction of end user. Thus, the organization must focus on providing sufficient user satisfaction. Various research studies on user training have revealed that such training can outstandingly affect user acceptance and utilization of a system (Hartono, Santhanam and Holsapple, 2007). User training helps user to understand and being expert in system use, and then being more comfortable in using the system. Usually, users are more satisfied with more experience of using the system and output of the system. Management support has also high rates as an antecedent of satisfaction. However, where such supports are missing, user training may be a fatality or interest or priority for using the system, which may suffer these supports. Even, users have frequently experienced a disagreement between their own inclination to use the system and management's irrelevance. However, none of these probabilities supports a constant atmosphere with user satisfaction (Hartono, Santhanam and Holsapple, 2007). Therefore, the following is hypothesized:

H2a: The more resource intensive training, the higher the satisfaction
H2b: The higher the quality of support, the higher the satisfaction
H2c: The higher the sophistication of use, the lower the satisfaction
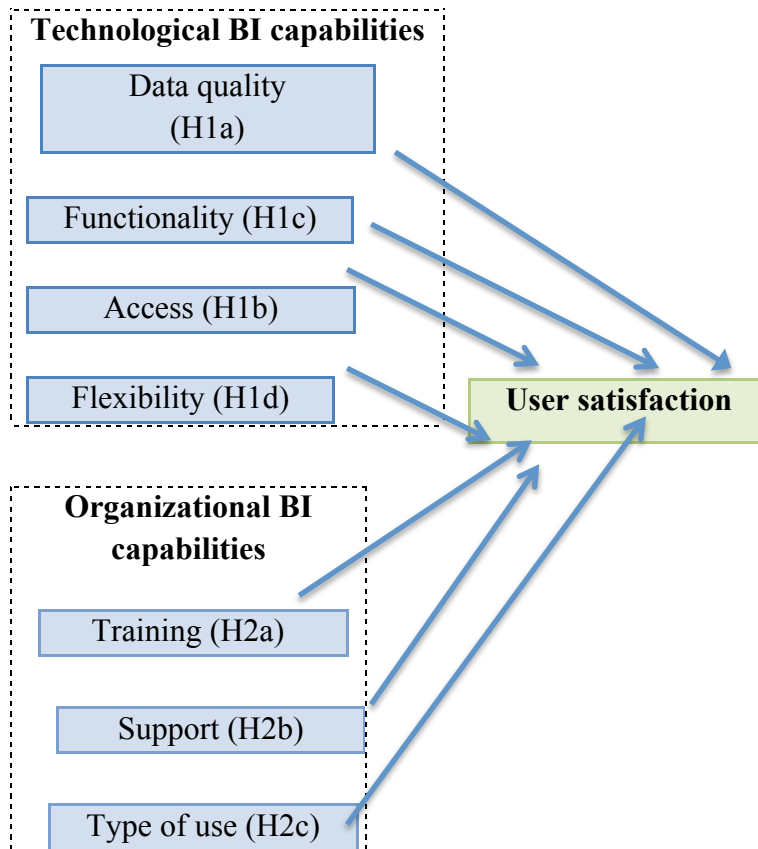
The research model is provided below:

Technological BI capabilities

Data quality
(H1a)

Functionality (H1c)

Access (H1b)

Flexibility (H1d)

User satisfaction

Organizational BI capabilities

Training (H2a)

Support (H2b)

Type of use (H2c)

Figure 2, Research model

METHOD

In this section the research methodology that used to test the study's hypotheses explains. This chapter includes of empirical selection and the way data were collected and analyzed.

Empirical Selection And Data Collection

As it was mentioned previously, the goal of this study is to investigate how do BI capabilities influence user satisfaction. Thus, to achieve the aim of this study, an online survey (questionnaire) was send to the 1000 users that use BI applications in a large global manufacturing company. However, the respondents were 514, which is a fairly high rate response (51%). Afterward, the hypotheses of this study are analyzed by SPSS. The survey was included of questions that measuring user satisfactions with BI capabilities. Items measuring user satisfaction were selected from Isik, et al. (2010; 2012)

The research method used in this study is a formal survey. A common purpose of survey research is to collect data representative of a population (Bartlett, Kotrlik and Higgins, 2001). Usually, researchers use information collected from the survey to generalize findings from a drawn sample back to a population within the limits of random errors. Within a quantitative survey method defining sample size and dealing with nonresponse bias is required. The benefit of survey research contains flexibility in reaching respondents from a wide-ranging scope (Bartlett, Kotrlik and Higgins, 2001). In this study the data was collected through a web-based (online) survey. There are several benefits of using online survey including the omission of paper, postage, email, and data arrival cost. Further, it is reduced the time required for implementation (Dillman, 2000). Additionally, it is easier to send reminders, follow-ups, and importing the gathered data into the data analysis program through a Web-based or online survey.

However, when criticizing business research, Wunsch (1986) state that "two of the most consistent flaws included (1) discharge for sampling error when determining sample size (2) discharge for response and nonresponse bias" (p.31). Thus, this study determines nonresponses bias by comparing the average values for dependent, independent, and demographic variables. To test the hypotheses of this study the Pearson correlation test was run. Correlation is significant at the 0.01 level (2- tailed).

Data Analysis And Results

In this section the data analysis and result are described. First, the respondents' rate and demographic results describe and then it follows by explaining the statistical analysis that performed to test the research framework and hypotheses. Finally, the results of these tests are introduced.

Demographic

The response rate was (51%), which considers as a fairly high rate for a survey with total population of 1000. Respondents include of 44% female and 56 % male users. The distribution of respondents is 59% from Europe, 21% from Asia, 19% from America, and 1% from Middle East and Africa. The demographic aspects represent a broad sample with respect to the length of experience and level of education. The descriptive statistics for gender, experience, and education is summarized in below in the table 1, 2, and 3 respectively.

Gender	
Female (n=226)	44%
Male (n=288)	56%
Total (n=514)	100%

Table 1, demographic, Gender

Level of experience by region			
	Beginner	Intermediate	Advanced
Asia (n=108)	22.22%	63.89%	13.89%
Europe (n=303)	54.23%	54.30%	37.16%
America (n=98)	22.86%	58.25%	38.41%
MEA (n=5)	60.00%	40.00%	0.00%

Table 2, demographic, level of experience by region

In general, most respondents (BI application users) are located in Europe (n=303), Asia (n=108) and America (n=98), who together accounts for 86% of the respondents (users). The intermediate users are highly visible across all geographies with the highest relative proportion found in Asia and America. Beginners are constantly spread throughout the regions (not counting MEA), with having Europe as the largest proportion. In terms of numbers of users, most beginners are located in Europe and Asia.

Level of education by region				
	High school or equivalent	College or university	Bachelor's degree	Master's degree
Asia (n=108)	1%	18%	54%	35%
Europe (n=303)	53%	38%	93%	121%
America (n=98)	3%	4%	52%	37%
MEA (n=5)	0%	0%	2%	3%
Total (n=514)	57%	60%	201%	196%

Table 3, demographic, level of education by region

When it comes to the level of education, most of the respondents (users) are in the bachelor level of education, master's degrees come visible after bachelors. The most educated users are located in Europe, Asia, and America respectively. However, the proportion of respondents (users) should be considered in this case (larger population shows higher percentage).

Hypotheses Testing And Results

Hypotheses 1a to 2c assert that technological and organization BI capabilities impact user satisfaction. (Table 4 below)

Technical BI capabilities (Data quality, Functionality, Access, Flexibility)	
H1a	The higher the data quality, the higher the satisfaction
H1b	The higher the access, the higher the satisfaction
H1c	The higher the functionality, the higher the satisfaction
H1d	The higher the flexibility, the higher the satisfaction
Organizational BI capabilities (Training, Support, Type of use)	
H2a	The more resource intensive training, the higher the satisfaction
H2b	The higher the quality of support, the higher the satisfaction
H2c	The higher the sophistication of use, the lower the satisfaction

Table 4, technological and organizational hypotheses

In order to achieve reliable results, the data was analyzed in the SPSS and then to test the hypotheses the Pearson correlation test was run. The Pearson correlation test was selected, because of the hypotheses type (unilateral equation). Pearson correlation test is an appropriate test when the equation is unilateral. All of the hypotheses posit to affect on the user satisfaction (i.e., that satisfaction does not any affect on the for example quality, access, and etc.)

The correlation is significant at the 0.01 level (2-tailed), which means all amounts below 0.01 are significant and correlated and further have positive relationship.

H1a: The higher the data quality, the higher the satisfaction
Pearson correlation value for BI capability (H1a)

Pearson correlation	Satisfaction
Quality	0.649**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

Result reveals that the hypothesis H1a is supported. This interprets that the higher the quality of data the higher the satisfaction. It means that the users are more satisfied with the higher quality of data. (Quality considers across categories such as completeness, timeliness, relevance, accuracy and reliability of data)

H1b: The higher the access, the higher the satisfaction
Pearson correlation value for BI capability (H1b)

Pearson correlation	Satisfaction
Access	0.641**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

The result for hypothesis H1b is also the same H1a supported, which means that the higher accessibility to BI applications make users more satisfied (the higher the access, the higher the satisfaction). Therefore, it is possible to claim what was theorized previously:

BI applications have capability to manage different information access mechanisms to provide right users and right accessibility. And as Isik, et al. (2012) claim, there are different BI mechanisms with different capabilities that serve different purposes. Since, different groups of users need different information for different reporting and analysis, organizations may need to employ different BI tools/mechanisms. BI applications are capable to provide both limited and unlimited access (depends on organizations' preference) to data analysis and reporting tools to all users. For instance, QlikTech, a web-centric BI application that provides analytical and reporting capabilities for all types of users (Havenstein, 2006).

The third Hypothesis is of the technical capability category is showing following:

H1c: The higher the functionality, the higher the satisfaction
Pearson correlation value for BI capability (H1c)

Pearson correlation	Satisfaction
Functionality	0.750**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

The Pearson correlation for the relationship between functionality and satisfaction is also supported. It interprets as functionality has positive correlation with user satisfaction. As functionality of a system develops, the satisfaction of users increases.

H1d: The higher the flexibility, the higher the satisfaction
Pearson correlation value for BI capability (H1c)

Pearson correlation	Satisfaction
Flexibility	0.682**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

The Pearson correlation for the relationship between flexibility and satisfaction is also supported. It means that flexibility has positive effect on user satisfaction. Flexibility of a system makes users more satisfied with that system. Further, the result says the BI applications are flexible and this makes user much satisfied.

As it was theorized earlier, organizations require the flexibility and robust functionality to achieve the optimal potential from their BI applications. An information system needs to be flexible; it must be able to adjust a certain number of variations exist in the business processes (Gebauer and Schober, 2006). Interested to know that BI applications can provide the required flexibility in the decision-making process (Isik, et al., 2012).

It is continued with organizational capabilities hypotheses:

H2a: The more resource intensive training, the higher the satisfaction
Pearson correlation value for BI capability (H2a)

Pearson correlation	Self study	Formal training (webex/E-learning)	Formal training within company	Other training
Satisfaction	-.014	.118**	.124**	.015
N	514	514	514	514

**Correlation is significant at the 0.01 (2-tailed)

The result from the table above shows that training and satisfaction have positive relationship only in term of formal training through both E-learning and company. The result shows no relationship between self-study and other training with satisfaction. This can be interpreted as formal training has positive effect on user satisfaction, which means the more resource intensive training, the higher satisfaction. Thus, the hypothesis 2a is supported. The Pearson correlation for both formal trainings is significant.

H2b: The higher the quality of support, the higher the satisfaction
Pearson correlation value for BI capability (H2b)

Pearson correlation	Satisfaction
Quality of support	0.240**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

The Pearson correlation for the relationship between quality of support and satisfaction is significant. It means that support has positive effect on user satisfaction. The quality of system admin support makes users more satisfied. Further, the result can be interpreted as BI applications have ability to supports the needs of users. Thus, it leads to higher satisfaction.

H2c: The higher the sophistication of use, the lower the satisfaction
Pearson correlation value for BI capability (H2c)

Pearson correlation	Satisfaction
Sophistication of use	0.698**
N	514

**. Correlation is significant at the 0.01 (2-tailed)

The same previous hypothesis, this hypothesis is also supported. The significant correlation between sophistication of use and satisfaction shows positive relationship, which means higher complexity and difficulty of use results to lower satisfaction of users and vice versa.

Thus, the results of hypotheses tests regarding the organizational BI capabilities support the previous theories, which claims that user training is the important factor in term of achieving better satisfaction of end user. Consequently, the organization must focus on providing sufficient user satisfaction. Various research studies on user training have revealed that such training can outstandingly affect user acceptance and utilization of a system (Hartono, Santhanam and Holsapple, 2007). User training helps user to understand and being expert in system use, and then being more comfortable in using the system. This interprets as user being more satisfied with more experience of using the system and output of the system. In addition, management support has also high rates as an antecedent of satisfaction. Where such supports are missing, user training may be a fatality or interest or priority for using the

system, which may suffer these supports. Even, users have frequently experienced a disagreement between their own inclination to use the system and management's irrelevance. However, none of these probabilities supports a constant atmosphere with user satisfaction (Hartono, Santhanam and Holsapple, 2007).

DISCUSSION AND SUGGESTIONS FOR FUTURE RESEARCH

The goal of this study is formulated in the research question, which is how do BI capabilities influence the user satisfaction. The results of hypothesis test reveal that both technical and organizational BI capabilities have positive effect on user satisfaction.

Technical BI capabilities and user satisfaction

Technical BI capabilities included of four different hypotheses, data quality (H1a), access (H1b), functionality (H1c), and flexibility (H1d). These hypotheses propose the higher the quality of technological BI capabilities, the higher user satisfaction. All of these hypotheses (H1a-1d) were confirmed by the positive relationship between all technological BI capabilities and user satisfaction. According to the results it can propose that technological BI capabilities are crucial factors for user satisfaction. Therefore, organizations should consider technological BI capabilities when they are going through BI applications implementation. However, the difference in the quality of these capabilities is very important, because as the quality of technological BI capabilities increases, the satisfaction of users also increases.
The results are also supports with prior research. Previous studies reveal that clean, high quality, and reliable data are important factors for system success with user satisfaction (Isik, et al., 2010). Various studies consistently point to a high level cohesion among successful BI implementations. They claim, organizations that are successful with their BI are those that created a strategic approach to their BI systems. This ensures that BI is stable with corporate business objectives. Relatively, Watson, et al. (2006) point out the Continental Airlines improved its processes and profits through BI capabilities and became successful with the implementation of BI. Furthermore, Malone (2005) refers to cardinal Health Care as a good succeed example, this organization is also benefited of BI capabilities concerning its business requirements. Clark, et al. (2007) and Hartono, et al. (2007) are also indicated several success model for management support systems through BI capabilities. They mention that it is quite important to understand BI capabilities and their influence of the decision environment in which BI is used.

Organizational BI capabilities and user satisfaction

Organizational BI capabilities consist of three hypotheses, resource intensive training (H2a), quality of support (H2b), and sophistication of use (H2c). These hypotheses suggest the higher quality of the organizational BI capabilities, the higher user satisfaction. All of these hypotheses (H2a-c) have positive relationship with satisfaction. They confirmed that the user satisfaction increases by higher quality of organizational BI capabilities. The same as technical BI capabilities, organizational BI capabilities are important for user satisfaction. Therefore, organizations should consider organizational BI capabilities when they are decided to implement BI applications. It is because; the quality of organizational BI capabilities impacts on the users satisfaction, the higher quality of organizational BI capabilities increases higher satisfaction for users and vice versa. The results are further supported by earlier research. Previous research reveals that in term of user Satisfaction, it would be a feeling

more than simply meeting the users' expectations about task/goal achievement (Oliver, 1997). Indeed, the terms disconfirmation of expectations and over-fulfillment drive to high level of satisfaction (Oliver and Wayne, 1988). Oliver and Wayne (1988) believe that high levels of user satisfaction might be found in an information technology which entertains user by understanding their expectations and allowing them to experience something more than simple task/goal achievement, for example, desire, enjoyment, and authorization or permission. Therefor, this needs to concentrate on user experience, which underlines arrangement, fun, and pleasure rather than only functionality or ease-of-use (Wright, et al., 2001; Marcus, 2002). This description says that satisfaction is a pleasurable response that rising from an assessment with respective to how fit the consumption of a product or service meets a need, desire, or goal.

However, this study investigates how BI capabilities (technological and organizational) influence user satisfaction. As it was mentioned earlier, there is a positive relationship between BI capabilities and user satisfaction. The key point with high rate satisfaction of users states that: it has direct effect in organizational effectiveness and it frequently used as a surrogate measure for BI success (Isik, et al., 2010; 2012).

The findings of the study reveal that there is still room for improving BI capabilities. It would be even interested to investigate how BI capabilities affect on the decision-making environment in an organization. Developing stronger and more advanced BI capabilities feasibly lead to support decision-makers (Elbashir, et al., 2008; Watson and Wixom, 2009). Advanced capabilities may be key to provide BI that successfully facilitates decisions in organizational environment. Designing more advanced BI capabilities within the proper decision environment is important for an organization to realize maximum benefits from its BI investment. Different decision types require different information; therefore developing BI capabilities may help decision-makers to make better decisions related to different situation in the organization (Isik, et al., 2011; 2010; Watson and Wixom, 2009; Elbashir, et al., 2008).

Accordingly, this study will positively contributes to practice by introducing information for managers and users of BI applications to think about their BI capabilities when they implementing BI applications, because as the results showed the higher quality of BI capabilities directly affects on the satisfaction of users. Higher satisfaction creates higher effectiveness in the organization (Isik, et al., 2010; 2012). Further, this study providing richer insight in the role of the BI capabilities related to user satisfaction and producing a framework for future research on the relationship between these two critical elements.

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