FACTORS EFFECT BUSINESS INTELLIGENCE SYSTEMS QUALITY (AN EMPIRICAL STUDY)

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Abstract

Business Intelligence Systems has an important role in education institution, which can be used support more effective strategic, tactical, and operational insights and decision-making. This study aims to determine factors effect business intelligence systems quality at education institution. This research was conducted at Bandung City of Indonesia. The number of samples taken from this study was 108 respondents Data was collected using a survey approach, where the research instrument used was a questionnaire. Data analyzed using multiple linear regression analysis techniques. The results show that Maturity Level of Information Technology Governance using COBIT 4.0 Framework has a positive effect on business intelligence systems quality; sharing culture has a positive and significant effect on business intelligence systems quality while value data has a positive and significant effect on business intelligence systems quality

Index Terms: Business Intelligence Systems Quality, IT Governance, Sharing Information Culture, Value Data.

1. INTRODUCTION

One of the tasks of the management of educational institutions is to assess how the organizational processes are running. For this reason, business intelligence methods and technology are very much needed, especially for teaching activities carried out, these activities become very difficult to measure so it is necessary to conclude whether the teaching methods used have succeeded or failed. In addition, by using business intelligence in educational institutions, organizations are expected to gain abilities such as; analyzing the form of questions and the results obtained by students, trends in taking courses for each student and each semester, analyzing the relationship and effect of the value of prerequisite courses with the courses taken, analyzing the number of students who passed and did not pass. Furthermore, the basis for making decisions will be better if processing is carried out from internal data with data obtained from external, this is for the purpose of analyzing which target market needs to be promoted for new student admissions as input to get quality students and abilities. in seeing student success in the world of work. With business intelligence, an educational institution is able to identify the target prospective students, the teaching staff recruitment process, the teaching and learning process that is right on target, and focused market needs with the right priority scale.

Business intelligence systems quality is influenced by many components, information technology is important when using information systems. This is because information

technology must be compatible with and support other information systems components. (Bagranoff, Nancy, Simkin, & Norman, 2010:37). Information systems cannot function in isolation and cannot have a purpose in a social (organizational) context. Its general purpose is to provide solutions to business problems. The social context of an information system according of values and credence that decide the acceptance of people and cultures by the organizations involved. The quality of an information system is determined by the people who use it, the business processes that support it, and the culture within the organization (Turban & Volonino, 2012:10).

Although there are many studies on the quality of information systems, or the quality of business intelligence systems, they have not been able to answer this research question because there are still fundamental debates that can be seen from the research that has been done on the quality of business intelligence systems (Almazan, Tovar, & Quintero, 2017), while other researchers discuss technology platform (Pinkreton, 2021), compatibility, relative advantage, information quality, and system quality (Jaradat., Z, et.al, 2022).

Based on this, it is important to conduct this research to answer research questions by examining how Information Technology governance maturity level and sharing culture affect the quality of business intelligence systems. The results of this study are expected to provide academic recommendations in implementing the business intelligence systems so that it can answer the problems that have been happening in educational institutions.

## 2. LITERATURE REVIEW

a) Technology Acceptance Model

The main theory in this study is the Technology Acceptance Model (TAM), introduced by Davis in 1989 is an adaptation of Theory of Reasoned Action (TRA) which is devoted to modelling user acceptance of the technology.

Information systems quality is defined by Davis et al. (1989) as perceived ease of use which is the degree to which computer technology is perceived relatively easy to understand and use. Information systems quality revealed that if users of information systems feel that using such a systems is easy, the user does not require much effort to function, so they will have more time to do something anything else that would likely improve their overall performance.

Several research models have been carried out to analyze and understand the factors that influence the acceptance of the use of technology computer, including those recorded in various literatures and reference results research in the field of information such as TRA, Theory of Planed Behavior (TPB), and TAM developed by Davis et al (2000) is one of the most widely used research models in information technology research, because this research model is simpler and easy to apply.

The TAM research model was developed from various theoretical perspectives. On initially, the diffusion innovation theory was the most dominating theory acceptance and various models of technology acceptance. TAM is TRA development and predicting user acceptance of technology. TAM describes There are two factors that dominantly affect technology integration. The first factor is the user's perception of the benefits of technology. Whereas the second factor affects the willingness to use technology. In general, technology users will have a positive perception of technology provided. Negative perceptions will arise as a result of use of the technology. The TAM model can be used as basis for determining the efforts needed to encourage will using technology.

Fig.1: Conceptual Framework
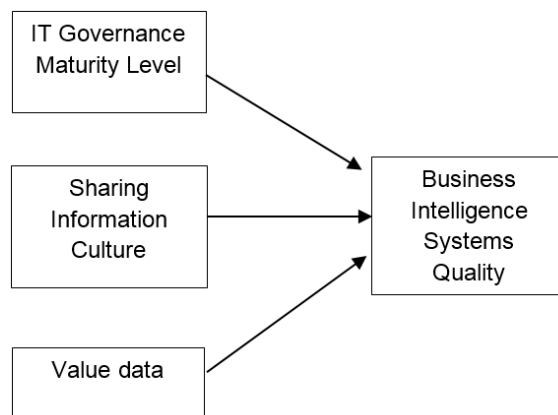
b) Research Hypothesis

Maturity models have been very successfully used in many different disciplines, is a way of measuring developed management processes. How well developed they should be depended on specific business needs.

The result from previous study Al-Shafeay, Al_Dujaili, Al-Wattar (2020) found that information technology have affected the information system by eliminating human errors, decreasing costs, increasing productivity, quality and effectiveness. Krubu & Osawaru (2011) found that ICT presents an opportunity to provide value-added information services and access to a wide variety of digital based information resources to their clients.

H1: "IT Governance Maturity has a positive and significant effect on Business intelligence systems quality"

Culture is recognized as an important factor influencing the development, deployment, and use of information systems in households and organizations as well as in the public sector Heinzl A, Leidner DE (2012), while the definition of culture is the collective programing of the human mind that distinguish the members of one human group from those of another, therefor culture is a system of collectively helped values (Hofsted, G., (1997). Information culture can be then a form of organizational culture – Information

culture can be understood as the skills of selection and decision making, competencies of conscious and benefitting for an individual (and in general) usage of an information space. Value of information refers not only to its material dimension. It has become a tool of socialization, a kind of a pass to a human community (Castells 2000).

The previous study by Romi, (2011) found the impact of organizational culture with its major types (clan, adhocracy, hierarchy, market) on the information systems success dimensions (system quality, information quality, service quality, usability, user satisfaction, net benefits). Another previous study found the perceived need, perceived information sharing, and effort expectancy influence attitude significantly influences information systems adoption (Mukred, Singh, Safie, 2017).

H2: "Sharing culture has a positive and significant effect on Business intelligence systems quality"

Data is a critical business asset (Abinito, 2022), value data issues have been addressed in several research areas, e.g. quality management in information systems, data cleaning, data warehousing, integration of heterogeneous databases and web information sources (Bertolazzi & Scannapieco, 2001). Data quality model in this research is taken from the external view of an information systems that concerned with the use and effect of an information system the dimension of value data external view are data-related and system-related, (Wand&Wang, 1996).

Value data is essential to effective use of information systems (Brodie, 1980); Harti & Jacob (2016) stated that data quality is a success factor for business intelligence and understood as the prerequisite for transparency and acceptance of the system

H3: "Value data has a positive and significant effect on Business intelligence systems quality"

3. METHODOLOGY

This research was an associative quantitative study and a descriptive method and explanatory research methods. This research was designed using the non-probability method using random sampling techniques. The sample was 108 employees of institutional education of the 27 institutional education in Bandung city, west Java, Indonesia. This study aims to test the hypothesis that has been stated above using the Multiple Regression Analysis. Data analysis method with programming tools that support primary data analysis in the form of SPSS 5.0. The data collected consists of primary data using documentation study techniques, limited interviews and questionnaires, and secondary data using data available either from the data publications or general data in various prints, report books, or electronics, including the website. The data collection method uses a survey method using questionnaire instruments and ordinal data measured using a 5-scale Likert approach. Classical hypothesis tests are computed with the goal that the resulting equations are good and unbiased equations. The test method of the research instrument is carried out by testing the reliability and validity.

Research conducted for IT Governance is using framework that has been accepted its widespread recognition is the COBIT (Control Objective for Information and Related Technology) 4.0 developed by ISACA (Information Systems and Control Association) and ITGI (IT Governance InstituteI). This model describes the evolutionary improvement and approach to assess, analyze, evaluate and recommend better information technology management. Through these method, it is hoped that it can become a new perspective regarding the evaluation of information systems, especially in educational institutions. path from The Information technology governance, which has five levels: Non-Existent, Initial/Adhoc, Repeatable but Intuitive, Defined, Managed and Measurable, Optimised. A maturity assessment, to identify gaps between the current and future state. A maturity assessment also provides an indication of strengths, weaknesses, opportunities, and threats. (IBM, 2022). COBIT's process model of four domains containing 34 generic processes, managing the IT resources to deliver information to the business according to business and governance requirements, namely : PO (Plan and Organized), AI (Acquire and Implement), DS (deliver and support) and ME (Monitoring and evaluate), (IT Governance Institute, 2005).

This study focused to PO (Plan and Organized) and AI (Acquire and Implement) domain to measure the IT maturity level.

Sharing information culture are conducted by the theory of Haag, Baltzan, Philips, (2008:11) that sharing information culture are measured by the Interdepartmental employees trust each other to use the interdepartmental information.

The need for context-dependent value data dimensions has been recognized. Currently, most value data measures are developed on an ad hoc basis to solve specific problems

4. RESULT AND DISSCUSSION

a) Description of Research Variables

1. IT maturity level

IT Maturity level in this study uses the IT Governance and the Cobit 4.0 framework conducted by self-assessment measured.

a. Maturity level calculation:

The average maturity level of domain PO (Plan and Organized) and AI (Acquire and Implement) is obtained from the results of calculating each respondent's answers in COBIT 4.0 are:

Average maturity level of the PO domain are 2, which means processes are follow a regular pattern and the average maturity level of the AI domain are 1, which means processes are ad hoc and disorganized, while the expected maturity of PO and AI domain are 3, which means processes are documented and communicated. The results of the study indicated that there was a gap between the current maturity and expected maturity, there are 5 gaps in the PO domain and 5 gaps are in the AI domain. Domains have to be

improved are PO3, PO4, PO6, PO8, PO9, AI1, AI2, AI3, AI4, AI5 domains.

b. Solution for the gaps:

After the maturity level calculation, this study offers the solution for the gaps, including:

Gaps in PO3 (determining technological direction); make IT planning for IT development, make documentation of IT infrastructure planning, make infrastructure planning training

Gaps in PO4 (define the IT processes, organization and relationships; IT organizations are actively involved in the company's business processes

Gaps in PO6 (communicate management aims and direction); establish quality management procedures

Gaps in PO8 (manage quality); planning, implementing and maintaining a quality standard system

Gaps in PO9 (assess and manage IT risk); risk management training for all employees

Gaps in AI1 (identifiy automated solution); identification of the implementation of service and infrastructure system solutions

Gaps in AI2 (acquire and maintain application software); maintenance of application security

Gaps in AI3 (acquire and maintain technologi infrastructure); maintenance of infrastructure TI

Gaps in AI4 (enable operation and use); standardization of process manual process documentation

Gaps in AI5 (procure IT resources); establish basic policies and procedures for IT acquisition

Top management must be committed to developing a business focus to enable alignment between business and IT objectives, establish a process orientation to define the scope and extent of coverage, with a defined structure enabling easy navigation of content, being consistent with accepted IT best practices and standards and independent of specific technologies, focused on implementing the solution for the IT governance maturity's gap to reach the desired level of maturity.

2. Sharing Information Culture

The description of sharing information culture based on the questioner that filled by the respondent, are:

There were as many as 82% respondents who stated that they "never used information for personal gain, and 12 % of respondents who stated that they often used information for personal gain", which means there are a gap as much as 18 % from the ideal condition.

There were as many as 73% respondents who stated "between other parts trust each other to use existing information" and 2% employees between other parts didn't trust each other to use existing information, the gap from ideal condition are as much as 27%

There were as many as 69% respondents who stated "use information to respond to changes and developments that occur outside the institution", and 4,1 % stated the opposite, which means there are a gap from ideal condition as much as 31%

There were as many as 52 % respondents who stated "together with other department employees open to new perspectives on radical change and create competitive advantage", the gap from the ideal condition as much as 48%.

Based on the analysis of questioner, there were employees have a different perception about the sharing information culture, and the statement "together with other department employees open to new perspectives on radical change and create competitive advantage" is has a greater gap as much as 48%, and the statement never used information for personal gain, is a lower gap as much as 18%.

The top management must be committed to implementing the sharing information culture through regular socialization, training among the employee, then the sharing information culture will be embedded in the employee, because culture can fluidly blend the intentions of top leaders with the knowledge and experiences of frontline employees. Cultural norms define what is encouraged, discouraged, accepted, or rejected within a group. When properly aligned with personal values, drives, and needs, culture can unleash tremendous amounts of energy toward a shared purpose and foster an organization's capacity to thrive. Shared behaviors, values, and assumptions and is most commonly experienced through the norms and expectations of a group culture can direct the thoughts and actions of group members over the long term. It develops through critical events in the collective life and learning of a group the key to a successful organization is to have a culture based on a strongly held and widely shared set of beliefs that are supported by strategy and structure.

3. Value Data

The description of value data external view dimension consist of data-related and system-related. Based on the questioner that filled by the respondent, the external view of data quality are:

There were as many as 78% respondents who stated that they "The data that you have used so far is accurate data", which means there are a gap as much as 22 % from the ideal condition (100%).

There were as many as 63% respondents who stated that they "The data that you have used so far has not changed", which means there are a gap as much as 37 % from the ideal condition (100%).

There were as many as 88 % respondents who stated that they "The data that you have used so far is the data that is in accordance with what you need", which means there are

a gap as much as 12 % from the ideal condition (100%).

There were as many as 74 % respondents who stated that they "The data that you have used so far is very easy to obtain", which means there are a gap as much as 26 % from the ideal condition (100%).

There were as many as 49 % respondents who stated that they "The data that you have used so far is available according to the time needed", which means there are a gap as much as 51 % from the ideal condition (100%).

Based on the analysis of questioner, there were employees stated there are problems in data quality from the statement "The data that you have used so far is available according to the time needed" is has a greater gap as much as 51%, and the statement "the data that you have used so far is accurate data", is a lower gap as much as 18%.

The top management must be focus on improvement the value data. Inaccuracy can be interpreted as a result of garbled mapping into a wrong state of the information system. Moreover, inaccuracy can be related to other data deficiencies identified in our model. First, ambiguity can lead to inference of the wrong state of the real-world system. Lack of precision is a case which is typically viewed as inaccuracy, but is ambiguity in our model. Second, incompleteness may cause choice of a wrong information system state during data production, resulting in incorrectness.

b) Multiple Linear Regression Analysis

Hypothesis testing used T-test or partial test was conducted to prove whether IT Governance Maturity Level, Sharing Information Culture and Value Data partially affect Business Intelligence Systems Quality.

1. IT Governance Maturity Level on Business Intelligence Systems Quality

The calculated t value for IT Governance Maturity Level is 1.664 with a p-value of 0.041. Because the t-count value is smaller than t-table and the p-value is greater than 0.05, hypothesis 1 is rejected. That is, the IT Governance Maturity Level has a positive but not significant effect on Business Intelligence Systems Quality this result is consistent with Mawengkang, Jamen (2016). this result means that the more mature IT in educational institution, the more business intelligence systems quality will increase This is evidence by the survey results on the self-assessment of information technology maturity levels as a whole are in the maturity stage of PO domain are in the level 2, and the average maturity level of the AI domain are in the level 1.

2. Sharing Information Culture on Business Intelligence Systems Quality

The calculated t value Sharing Information Culture variable is 2.384 with a p-value of 0.005. Because the t-count is greater than t-table and the p-value is less than 0.05, hypothesis 2 is accepted. That is, Sharing Information Culture has a positive and significant effect on Business Intelligence Systems Quality, this result means that the higher sharing information culture applied in educational institution, the more business intelligence systems quality will increase. It can be explained that the social networks

within institution are open minded encouraging their employees to make their knowledge available to others such as share resources, time, services, knowledge, information, and support based on solidarity to achieve more business intelligence systems quality. This result is consistent with Romi, (2011); Mukred, Singh and Safie. (2017). this is evidence most respondents stated that they never used information for personal gain and trust each other to use existing information.

3. Value Data on Business intelligence systems quality on Business Intelligence Systems Quality

The calculated t value of value data variable is 3.745 with a p-value of 0.005. Because the t-count is greater than t-table and the p-value is less than 0.05, hypothesis 3 is accepted. That is, value data has a positive and significant effect on Business Intelligence Systems Quality, this result means that the higher value of data in educational institution, the more business intelligence systems quality will increase. It can be explained that value data is important because we need: accurate and timely information to manage services and accountability. Good information to manage service effectiveness. To prioritise and ensure the best use of resources. Correctly managed master data improves and supports decision making tremendously by providing information consistency and the reduction of data redundancy. This result is consistent with systems (Brodie, 1980); Harti & Jacob (2016). This is evidence most respondents stated that they never used information for personal gain and trust each other to use existing information.

5. CONCLUSION

By understanding the maturity state of the organization from its current state as it is to a future desired state and to determine correct improvement priorities, a renewed mindset to a new awareness of continuous improvement of process performance through measurement of the level of maturity of information technology, as well as sharing information culture is needed to improve the quality of business intelligence systems in educational institutions.

The limitation of this study was the selection of ideal indicators for each variable based on in-depth interviews with key informants. For future research, recommend creating a suitable literature review and adding other variables such as knowledge management. Educational institution can be used the results of this study as a reference to improvement Business Intelligence Systems Quality by implemented Functional culture, Sharing culture, Inquiring Culture and Discovery Culture is the components of information culture as the higher influence to the Business Intelligence Systems Quality.

Companies must deal with both the subjective perceptions of the individuals involved with the data, and the objective measurements based on the data set in question. Subjective value data assessments reflect the needs and experiences of stakeholders: the collectors, custodians, and consumers of data products.

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