



## Determination of Executive Information System: Data Warehouse, Business Intelligence and Brainware (Literature Review)

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**Abstract:** This literature review is themed on Determination of Executive Information System Data Warehouse, Business Intelligence, and Brainware, which is a scientific article that aims to compile a research hypothesis, namely the influence between variables so that it can be used for further research in the field of executive support systems for business. The writing of this article uses the literature review method or it can be called the library research method. This data is taken from articles such as Google Scholar, Google Scholar, the Mendeley application, which provides articles and scientific journals. The results of writing this article are 1) Information technology has an influence on the Executive Information System, 2) Business Intelligence has an influence on the Executive Information System and 3) Brainware has an influence on the Executive Information System. Outside the variables above also affect the endogenous variables of the Information System executive and there are many other factors that may influence the next variable.

**Keyword:** Executive Information System, Data Warehouse, Business Intelligence and Brainware

### INTRODUCTION

Research or research is an activity to analyze problems and phenomena so as to produce a scientific work. Scientific work is one of the main things in this era, for the rank requirements for lecturers and graduation requirements for students, both undergraduate, masters, and doctoral students. The results of these scientific articles will then be published in scientific journals that are widely available in Indonesia and internationally. These requirements or conditions are realized to make students more productive and have broad insights.

Based on several problems faced by students, and some authors often find it difficult to find previous sources as sources or support for writing scientific papers. Supporting articles usually lie in previous research that is used to prove gaps or differences in research written by

the author with previous research. It is also intended as a tool to create conjectures and influence between variables. In this article, we discuss the influence of data warehouse, business intelligence, and brainware on the Executive Information System, written using a literature review approach, so that this article presents several collections of previous research that will be discussed and compared with the discussion in this article.

Based on the problems disclosed in the introduction or background above, this research has the following problem formulation:

1. Does the Data Warehouse have an impact on the Executive Information System?.
2. Does business intelligence make an impact on the Executive Information System?.
3. Does brainware have an impact on the Executive Information System?.

## LITERATURE REVIEW

Business organizations are very dynamic and continue to make updates along with the development of the use of information and communication technology. EIS is one of the executive support systems in the decision-making brainware of educational institutions. EIS support is crucial in providing information that becomes an important decision in formulating policies effectively to strengthen the performance of educational institutions.

EIS is a type of information tool from data actors or controllers that functions to prepare or make decisions from the executive. This provides easier access both internally and externally to information related to achieving the strategic objectives of an organization or company (Ali 2021). EIS has a function, providing intelligence needed in decision making, which has many similar functions as Enterprise Resource Planning (ERP), Online Analytical Processing (OLAP) and others (Negash 2004).

The application of EIS can improve the quality and quantity of information and increase the level of executive performance to make strategic decision making. EIS is able to extract, filter, and detect important organizational information, in addition to allowing access to various information in a multi-dimensional format related to the organization's business (Averweg & Roldan 2006).

EIS development can overcome time-consuming manual data collection, can help executives to see organizational situations from different perspectives and allows strategies to be formulated. The EIS implementation has been identified as being able to combine and map various internal and external information that will present the data and perform an overall comparative analysis (Mahamsiatus & Rozilawati, 2011).

Information system executives are urgently needed in business development because of the problem of knowledge that is often limited about the importance of technology for executives, data presented is inaccurate and internal problems of the institution itself such as miss communication between executives and subordinates, executive dependence on other people, executive activity density (Winanti, Meyliana, Achmad Nizar Hidayanto, Harjanto Prabowo, 2018).

Previous research on EIS is (Mahamsiatus Kamaruddin, 2017), (Winanti, Meyliana, Achmad Nizar Hidayanto, Harjanto Prabowo, 2018), and (Nasril Sany1, Uke Nurjanah2, 2019).

### Data Warehouse

Data Warehouse is an application for historical data storage that is organized according to the theme on the subject useful for making decisions in a company or organization. Provide facilities for several activities such as this data and provide decision-making facilities in a company (Malik, Shadan 2005).

According to Paulraj (2001), data warehouse is the basic data for storing current and past data that comes from various types of data sources, both internal and external. This tool is also the main thing for brainware in an organization, and is used for analysis purposes. This data is also used for brainware in reporting decision making.

There are four characteristics in Data Warehouse:

1. Oriented towards the subject  
Data Warehouse is created to identify data based on certain themes or subjects that have been made by the organization.
2. Integrated  
This means that a set of data obtained from various types of sources into an interconnected program. Through this integration linkage it means that this data has different functions useful for compiling the basic data of the data warehouse. The data warehouse stores and adheres to well-known and consistent conventions using structured and coded formats and interrelated traits and characteristics.
3. Overall timeframe  
In the data warehouse, it is ensured that it has accuracy and validity within a certain time span
4. Non-volatile  
Non-volatile is data located in the data warehouse that is not updated in real time, but the operational system refreshes regular data regularly. This data is data that is added to the basic data and as a replacement and complement of the present.

The Data Warehouse creates modeling concepts that have been prepared by dimensional modeling which are explained as follows:

1. Star Schema (star scheme)  
This model is a star-shaped schematic structure model that aims to provide an easy understanding of the user so that they can work comfortably. This structure reflects how users see the long critical measures of their business dimensions (Ponniah 2011, p. 232).
2. Snowflake Schema  
In accordance with the shape of a star or snowflake schema, this schema shows a method with the normalization type of dimension tables in a star schema, when the user actually normalizes the dimension table, the user will produce a structure that resembles a snowflake with a fact table in the middle (Ponniah 2011, p. 259).
3. Fact Constellation Schema  
Fact or constellation schema, the fact of this schema is a schema that is structured from a list of data related to data dimensions (Han 2006, p. 117).

Basic data also has a process that is used to compile the data warehouse

1. ETL (extract, transform, and load)  
ETL is the stage where users migrate from basic operational data to data warehouse
2. Online Transaction Processing  
According to Kimball (2008, p.408), OLTP is a description of all the steps carried out by the system relating to data entered in this database.

This data warehouse has been extensively researched by previous researchers (M. I. Afandi, E. D. Wahyuni 2018), Atena Mirhosseini Vakili (2018), Joko Christian (2010)

## **Business Intelligence**

Business intelligence is defined as the data identification stage. Business intelligence is a stage in the application of tools and strategies to compile and collect data and then identify data points that have been collected both external and internal sources (internal, external) to create insights and assist in corporate decision making. On the other hand Inta Legend business is a multidimensional theory or concept of effective strategic planning effective

practice and organizational technology that creates fundamental knowledge data to support the organization (Ramadhansyah, 2019.)

According to Suman, M. G. Marković, and B. Jadro, (2014) the concepts or theoretical views of business intelligence are as follows:

1. An information or knowledge insight related to an organization. Where this is described in a business environment, markets, customers, competitors and economic problems.
2. Processed through the organization that obtains the data is then identified and distributed to companies to be used to make a decision. In business operations, in other words, business intelligence is a term in which tools for aggregating data or identifying tools, applications and methodologies within a company.

Business intelligence is used as a strategy within the company to occupy a very important position, namely brainware work monitoring business activities and reporting this character grouping includes identification or development of data and online Analytical processes or identification caterpillar dashboard score card warning and reporting systems (S. Rouhani, A. Ashrafi, A. Z. Ravasan, and S. Afshari, 2016.)

Business intelligence management must be managed according to information and communication techniques so that it fits business needs, adjusted and linked through business intelligence brainware appropriately, so companies will be able to gain success in the process of reporting and making decisions. very important because it affects the goals of the company including the quality of goods, the quality of decisions and business intelligence processes, in fact, it is influenced by information and communication systems (Urumsah and H. Ramadhansyah, 2019.)

Company managers are tasked with building values and a healthy competitive spirit so that company goals are achieved. This requires a management program that specifically supports and supports decision making. The advantages of this program are summarized into three benefits, namely the main construction as a producer of better decisions or knowledge, decision time regression and reduction of decision costs that are influenced by intelligence system functions, type of business intelligence. (Rouhani, 2016.):

1. The stage or process of good knowledge is an important step for companies to make a decision. Where data is needed brainware data and transforming knowledge that is useful for business decisions is insight and knowledge.
2. Reducing the decision-making time is very important for managerial satisfaction in this case accompanied by the overall processing of information in the decision-making process in a nutshell and has been proposed as a managerial requirement. Managers prepare information accurately and quickly with supporting information expected with a successful end. The third decision cost reduction is a system that is expected throughout the company that will motivate for cost reduction in decision making.

## **Brainware**

Brainware is an actor who performs or operates a computer and has a main point. Therefore, without brainware, the computer cannot be operated or the perpetrators are usually humans, in this case people who are involved in an activity or use a computer are referred to as brainware. (Syafrial Fachri: 2020, 63).

Brainware factors such as staff's lack of knowledge about the use of hospital management information systems can lead to low officer performance (Yuli 2006). Brainware has been extensively researched by previous researchers, including; (Rahmawati 2019); (Ave Maria 2017); (Azhima and Students 2011); (Oktafian Nasri 2019); (Jihan Anfa 2016); (Julian and Ali are undated); (Yuli 2006); (Friday 2019) and (Sidiq 2018).

**Table 1: Relevant past research**

No	Author (year)	Previous Research Results	Similarities with this article	Difference with this article
1	Wahono, S., & Ali, H. (2021).	DSS software provides a command for the computer in the form of a data warehouse, namely a company data repository that functions to carry out the decision-making process accurately and becomes the company's strategy to win competition in decisions. This Warehouse system is very important to improve company management in the decision-making process.	Business intelligence gives influence to the Executive Information System	The Data Warehouse influences the Executive Information System in winning the competition in the system business decisions of a company X
2	Prabowo, D. A. P., Afandi, M. I., & Wahyuni, E. D. (2020).	The Data Warehouse feature that can be created in this system is to store past data and current data by using the add hoq query feature which has the power to store. This data increases the accuracy of academic executives to choose a report and decision in addition to the large amount of data available in the academic executive information system.	The Data Warehouse gives influence to the Executive Information System	Brainware influences the Executive Information System in sorting executive academic reports and decisions
3	Afandi MI & Wahyuni ED. (2018)	The resulting data warehouse is then integrated with the resulting EIS application which is proven to be effective in fulfilling user inquiries efficiently. Although the potential for further research and development in the future is still wide open, the current version of BELA has shown to be useful, easy, and flexible and gives influence to academic executive decisions.	Data Warehouse & Business intelligence provides influence to the Executive Information System	Data Warehouse and business intelligence in the form of BELLA influence academic decision making
.4	Munawar, Z., Herdiana, Y., Putri, N. I., & Rustiyana, R. (2021).	The results of this study indicate that business intelligence has an overall relationship to the mediating effect of academic information system data quality. Business intelligence has a significant impact on academics and industry in increasing the accurate decisions of academic executives related to business information solutions and active management of business information.	Business intelligence gives influence to the Executive Information System	Business intelligence influences the Executive Information System in improving both academic and industrial decision making
.5	Setyowati, W., Widayanti, R., & Supriyanti, D. (2021).	Data Warehouse, Business Intelligence and Brainware have a positive and significant impact on the Executive Information System	Data Warehouse & Business intelligence provides influence to the Executive Information System ion System	Brainware influences the Executive Information System

6	Renaldo, N., Jollyta, D., Suhardjo, S., Fransisca, L., & Rosyadi, M. (2022,	The results of this study explain about business intelligence in the form of a Business Information System or EBIS where in using this system, companies benefit from Commercial and global success, even through this Indonesia has achieved national goals in business and e-commerce with the fastest development	Business intelligence gives influence to the Executive Information System	Business intelligence or Business Information Systems or EBIS makes an impact on Commercial and global success
7	Nugroho, F., & Ali, H. (2022).	The results of this study indicate that the SIMRS Hospital management information system uses a system with hardware, software, and brainware technology, for executive support systems for business. Each business technology has a significant influence on SIMRS, so that all decisions taken by the Hospital have strong accuracy	systems with brainware technology influence the Executive Information System	systems with brainware technology influence the Executive Information System in making SIMRS or hospital decisions
8	Sitepu, R. B., Handriana, T., & Yulianti, P. (2021).	From the results of testing database costs, infrastructure costs, brainware costs and software costs in the Increase in Information Technology Budget, it was found that only infrastructure and software costs had a significant influence on increasing the Information Technology Budget. While database costs and brainware costs do not have a significant effect on Information Technology Budget Increase	Use of systems with brainware technology for the Executive Information System	Brainware costs do not significantly influence Information Technology Budget Increase
9	Syadzili, A. M. S. A. (2019).	The results of this study indicate that the use of data has the effect of increasing the information dissemination system of the Immigration Office class 2 TPI Parepare information in quality passport services and fulfilling the relevance of timelines and complete accuracy	The results of this study indicate that the use of data has the effect of increasing the influence of improving the information dissemination system of the Immigration Office class 2 TPI Parepare information in quality passport services and fulfilling the relevance of timelines and complete accuracy	The results of this study indicate that the use of data has the effect of increasing the influence of improving the information dissemination system of the Immigration Office class 2 TPI Parepare information in quality passport services and fulfilling the relevance of timelines and complete accuracy

**RESEARCH METHODS**

In the research or writing of this article which is writing a literature review, a descriptive qualitative method is used, using a literature review approach. Data comes from Google applications, Mendeley, and Academic applications related to articles or publications. In this study, theory is used consistently with assumptions related to the formulation of the problem and the data methodology is used inductively so that it fits the questions and problems formulated. The reason for using this research method is because this research



method is exploratory in nature which is useful for use by future researchers (Ali & Limakrisna, 2013).

Data collection uses library observation techniques and descriptive analysis. Data collected through Google Scholar and others is analyzed using descriptive methods or by identifying each data and describing it with relevant and concrete explanations so that an understanding conclusion can be drawn.

## **FINDINGS AND DISCUSSION**

Based on relevant theoretical studies and previous research, the discussion of this literature review article is:

### **1. The influence of the Data Warehouse on the Executive Information System**

The Data Warehouse has a significant influence on the Executive Information System. In this case, the data warehouse dimensions or indicators are Data Marts or online reporting support, Analytical Processing, which is basic data processing using fact tables, Online Transaction Processing, which is related to transaction operational activities to store data, dimension tables related to categories or characteristics of detailed data. to be reported, and Tables or tables containing numbers and historical keyword data. All points have an influence on the dimensions or indicators of the Executive Information System at PMI for the North Sulawesi region to seek to improve services in the social sector, especially humanity, as the role of implementing health efforts, blood transfusions. This system is carried out as a provider of data processing systems, donations include management of blood donors, data processing, up to the number of bags received by the Hospital or PMI and patient management or arrangements. This data can be managed well even though it is very complex in the North Sulawesi area by using this system, especially in the decision-making process and when determining plans or plans to be carried out in estimating the number of blood bags, donors, or any problems related to PMI and blood donors (Pratasik, S., 2019).

To improve the Executive Information System by paying attention to the Data Warehouse, what management must do is carry out several regulatory processes for the data warehouse design stages in the form of process selection, grain selection or what is called installation, selection of some of the data needed such as Emergency Installation (IGD), then the last hospital service indicator is to determine the dimensions that are determined related to facts and problems that exist within the company or agency, such as the dimensions of time, space, care, dimensions of the patient's condition according to the functional requirements of the hospital (Izhariman, L. , Darwiyanto, E., & Puspitasari, S. (2017).

Data Warehouse has an influence on the Executive Information System, if the Data Warehouse is assumed to be positive by consumers, therefore in improving company services in the Executive Information System. Leaders can see directly the condition of existing customers at PT Pelindo 1. This study aims to design and build an executive Information System at PT Pelindo 1. The method used is the iconix process for displaying auction status (Hutasuhut, D. I. G., Ambiyar, A., Syahputri , N., Indriani, U., Astuti, E., & Verawardina, U. (2021).

The Data Warehouse has an influence on the Executive Information System, this is in line with research conducted by: (Christian, J. (2016), Wijaya, R., & Pudjoatmodjo, B. (2016), Djunaedi, A. Subiyakto, and E. Fetrina , (2017), I. S. Harumy, T.H.F,(2016), and (E. W. Guntari, A. S. Permana, and F. R. Umbara, (2020).

### **2. The influence of business intelligence on the Executive Information System**

Business intelligence has an influence on the Executive Information System, where the dimensions or indicators of business intelligence (Planning database or data sources planning

the data warehouse ITL stages extract transformation and loading the final OLAP cube preparation is compiling a data report or a report) have an influence on the dimensions or indicators Executive Information System (In the NorthWind Company readers support product analysis from employees. This can be seen from sales performance and employee performance which will have an impact on company assets, of course, it can also increase company profits. Implementation of information systems is an activity by activating Real Time data access which is used as as business intelligence. On the other hand, most businesses take advantage of this business intelligence. Information systems consist of e-commerce systems, knowledge management systems, and decision support systems (Putri, R. R., 2018).

To improve the Executive Information System by paying attention to Business Intelligence, therefore, organizational managers should make the most of business processes. In this case, reduce the risk of shortage of costs and continue to increase added value. Business intelligence becomes a real advantage for companies in processing information centers in a practical and accurate manner. Management should enable user business intelligence to transfer information into different formats and provide diverse information benefits to everyday workers. In addition, management must increase the transparency of corporate actions with the help of BI, so that employees are fully responsible for their respective work duties. Furthermore, management must manage the relationship between each of the available information in a complex way to become more specific and ultimately produce an appropriate and accurate decision in accordance with company goals (Rudiawan, H. (2021).

Business intelligence has an influence on the Executive Information System, if business intelligence is recognized as quality and well deserved, it can certainly add the highest rating to the quality of the Executive Information System. The important thing to do is to improve accuracy in decision making to carry out the analysis process in accelerating the stages of searching for information by making an assessment and producing an analysis of the development of sales of goods at PT Winsa. In addition, business intelligence can also find out the sales of goods that are trending and are most in demand by consumers, then business intelligence can also support organizations in "making decisions" using the roadmap method (Ariani, T. R., Tania, K. D., & Indah, D. R. ( 2017).

Business intelligence has an influence on the Executive Information System, this is in line with research conducted by: (Siregar, R. E. (2021). Saputra, A. S. (2021). Bahiyah, N., & Sejati, R. H. P. (2012), Rezkiani, R., Indrajit, R. E., & Fauzy, M. (2017) Alviana, S., & Kurniawan, B. (2019).

### **3. The Effect of Brainware on the Executive Information System**

Brainware exerts influence on Information System executives. In this case the dimensions or indicators of brainware include having or delivering support, users or conveyers, designers, and finally the builders of the information system Builder have an influence on the dimensions or indicators of the Executive Information System, namely the accuracy of mandatory and correct information, the information must be accurate, the information provided must be according to request or based on pictures (Prio, A., Lathifah, A., & Indriyanah, A. (2022).

To improve the Executive Information System by paying attention to Brainware, so that managers carry out planning, action, coordinating and controlling management in a company or organization where the principle is to improve company performance (Frisdayanti, A. (2019).

Brainware has an impact on the Executive Information System, if business intelligence is perceived well by customers/consumers then this will be able to increase the truth and



accuracy in decision making of an organization or company because this system provides extensive explanations about challenges and opportunities by optimizing resources in Executive Information System (Huh, E. N., & Hossain, M. I. (2021).

Brainware research has been carried out by several previous researchers such as Setiawan, H. (2022). Sidh, R. (2013). Aswiputri, M. (2022). Gede Endra Bratha, W. (2022), and Biaggi Julian Biaggi Julian, M. M., & Ali, H (2021).

### Conceptual Framework

Based on the preparation of relevant previous research theoretical problem formulations and the discussion discussed including the influence between variables, therefore in this study a framework of thinking was obtained which will be described as follows:

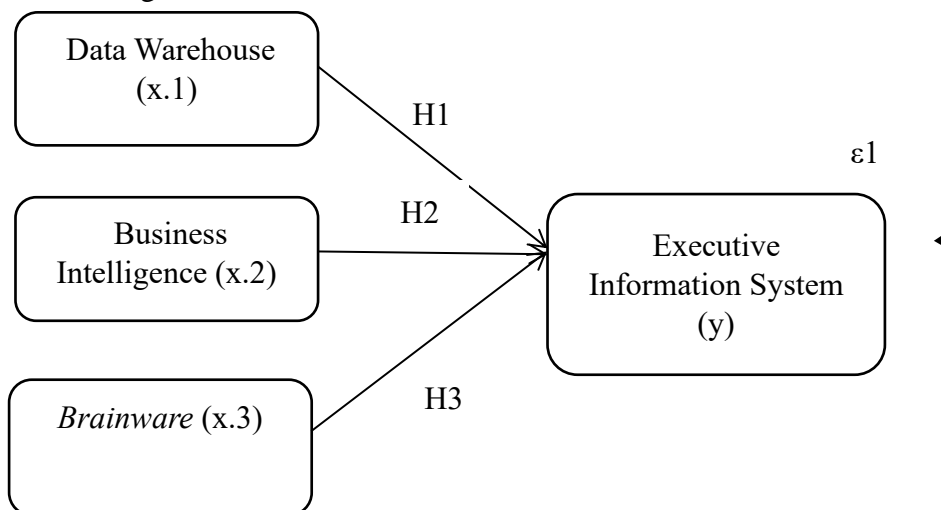


Figure 1: Conceptual Framework

Based on the conceptual framework picture above, then: Data Warehouse, Business Intelligence, and Brainware affect the Executive Information System.

Apart from these three exogenous variables that affect the Executive Information System, there are many other variables that influence it, including:

- a) Culture: (Harini et al., 2020), (Limakrisna et al., 2016), (Elmi et al., 2016), (Riyanto, B, et al., 2017), (Purba et al., 2017), (Widodo et al., 2020), (Widodo et al., 2020), (Maisah & Ali, 2020)
- b) Creativity: (Desfiandi et al., 2017), (Yacob et al., 2020), (Richardo et al., 2020), (Christina Catur Widayati et al., 2020), (Prayetno & Ali, 2020), (C.C. Widayati et al., 2020)
- c) Organization: (Sari & Ali, 2019), (Brata, Husani, Hapzi, 2017), (Limakrisna et al., 2016), (Desfiandi et al., 2017), (Harini et al., 2020), (Riyanto, Pratomo, et al., 2017), (Sulaeman et al., 2019), (Ali, 1926), (Masydzulhak et al., 2016), (Widodo et al., 2017), (Silitonga et al., 2017), (Rivai et al., 2017), (Prayetno & Ali, 2017), (Saputra & Ali, 2021), (Saputra & Ali, 2022).
- d) System: (Shobirin & Hapzi Ali, 2019), (Ashshidiqy & Ali, 2019), (Sari & Ali, 2019), (Djojo & Ali, 2012), (Darwisyah et al., 2021), (Somad, A., Imron Rosadi, K., & Ali, 2021), (Erlina Gusnita, Hapzi Ali, 2021)
- e) Software: (Indarsin & Ali, 2017), (Assagaf & Ali, 2017)
- f) Data Warehouse / Information technology: (Ashshidiqy & Ali, 2019), (Djojo & Ali, 2012), (Maisharoh & Ali, 2020),
- g) Systematic Thinking: (Darwisyah et al., 2021), (Iryani et al., 2021),
- h) Information System: (Sari & Ali, 2019), (Shobirin & Hapzi Ali, 2019), (Ashshidiqy & Ali, 2019), (Djojo & Ali, 2012), (Sari & Ali, 2019),

## CONCLUSION AND SUGGESTIONS

### Conclusion

Based on the theory, relevant articles and discussion, hypotheses can be formulated for further research:

1. The Data Warehouse influences the Executive Information System.
2. Business intelligence influences the Executive Information System.
3. Brainware influences the Executive Information System.

### Suggestions

Based on the conclusions that have been prepared above, there are suggestions for the author, because the author feels that writing this scientific paper still has many shortcomings, including a discussion of the factors that influence the Executive Information System. On the other hand, data warehouse, business intelligence, brainware also need a lot of improvement, therefore more in-depth studies are needed on other factors that affect the executive Information System. So there are possibilities apart from the three variables above, this article can also add other variables such as organization, creativity, and service.

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