

Design of Data Visualization for Publication of Scientific Work by Lecturers of The Management Master's Program

1st Baskoro

Fakultas Ilmu Komputer
IIB Darmajaya

Bandar Lampung, Lampung

baskoro.baskoro.2021211008@mail.darmajaya.ac.id

2nd Fely Dany Prasetya

Fakultas Ilmu Komputer
IIB Darmajaya

Bandar Lampung, Lampung

fely.prasetya.2021211014@mail.darmajaya.ac.id

3rd Iwan Tri Bowo

Fakultas Ilmu Komputer
IIB Darmajaya

Bandar Lampung, Lampung

iwan.bowo.2021211018@mail.darmajaya.ac.id

4th Prilian Ayu Minarni

Fakultas Ilmu Komputer
IIB Darmajaya

Bandar Lampung, Lampung

prilian.minarni.2021211027@mail.darmajaya.ac.id

line 1: 5th Muhammad Said Hasibuan

line 2: Fakultas Ilmu Komputer
IIB Darmajaya

Bandar Lampung, Lampung

msaid@darmajaya.ac.id

Abstract— *Research which is one of the elements of Tri Dharma has been carried out by lecturers as tasks and responsibilities that are carried out regularly every year. Create data visualizations using Google Data Studio, which can provide information on scientific publications for Master of Management lecturers based on the track record of submission of each lecturer based on the citation index of published scientific works, and find out the location or city of Master of Management lecturers from Bachelor to Doctoral. This research has succeeded in displaying data visualization of lecturers' scientific publications using Google Data Studio according to the citation index so as to help leaders evaluate lecturer's performance. The data sources used in this data visualization system with Google Data Studio are stored in Google Sheets. Data is collected from Google Scholar, Scopus, and WOS sites. This study also presents data on the history of lecturers' education by showing where the management master's lecturers have studied*

Keywords—*Dashboard, Scientific Work Lecturers, Google Data Studio;*

I. INTRODUCTION

Lecturers are professional educators and scientists with the main task of transforming, developing, and disseminating science, technology, and art through education, research, and community service[1]. The main task of lecturers according to the law on teachers and lecturers is the application of the Tri Dharma of Higher Education for lecturers. Research which is one of the elements of the Tri Dharma has been carried out by lecturers as tasks and responsibilities carried out

Higher Education IIB Darmajaya has 9 operating study programs, one of which is the Master of Management study program, the Master of Management study program has 7 active lecturers. Every year these lecturers publish scientific papers to fulfill their research assignments. In

evaluating the performance of lecturers so far the study program is still doing manual calculations by recapitulating the lecturers' scientific works that are published and only documented. In today's era, a system like this is far behind for monitoring needs and cannot provide information quickly.

Making data visualizations using Google Data Studio which can display scientific publications of Master of Management lecturers based on the track record of each lecturer's submission, is very helpful for leaders in evaluating the performance of lecturers in fulfilling their responsibilities. In addition to displaying scientific publications, this lecturer dashboard also provides information on the location or city where the Master of Management Lecturer is studying to provide information on the educational history of the Master of Management lecturer IIB Darmajaya. The results of this study can be known quickly and easily without manual calculation of the number of scientific papers published by Master of Management lecturers according to the citation index of scientific works such as Google Scholar, Scopus, and Web of Science (WoS). The results of this data visualization are expected to be a solution to existing problems, the information available in this data visualization can be understood quickly because it uses responsive and supportive graphs and tables. This will save time and energy in data processing and minimize the possibility of human error because almost all calculations are done by software.

II. LITERATUR REVIEW

A. Previous Research

Previous research that is on the same topic as this research and is the basis of this research will be shown in table 1 below:

Table 1. Previous Research

Title	Strength	Weakness
Implementation of Business Intelligence System For Research Data in Higher Education [2]	The research dashboard designed to assist leaders in analyzing data to study research trends carried out at XYZ College, and can be used to support decision making and later can also be used as a lecturer's performance measurement	This study does not explain the citation index of each lecturer's scientific work
Publication Information System Design and Research of Lecturers[3]	On the information system this can be displayed / research graph based on the year of publication or research, based on lecturers and type of publication or research	This study does not explain the citation index of each lecturer's scientific work

Table 1 above explains the titles, strengths, and weaknesses of previous studies with the same topic as this study. The research gap from previous research is that both in displaying data visualization, they do not provide information about the citation index of scientific papers published by lecturers. So that the authors are interested in conducting research by providing information related to the citation index of scientific works published by lecturers.

B. Data Visualization

The development of information systems has influenced data presentation pattern. Generally the data is displayed in the form of a table, but now the presentation and good and correct data visualization and in accordance with the need to provide more information value good for use. The visualization technique is convert data into a visual format so that characteristics of the data and the relationships between the data can be analyzed and reported [4].

A visualization can be defined as a function that maps from a data point domain to various visual primitives. The main purpose of visualization is to get people to visually estimate size. In this sense, geometric primitives are visually twice as large to represent twice as large data. This is especially true for visualization analysis. We claim a "good" visualization if the accurate data point size is recognized by visual primitives [5].

In visualization, data, information and knowledge are three terms used extensively, often in an interrelated context. In many cases, they are used to indicate different levels of abstraction, understanding or truthfulness . for instances,visualization is concerned with exploring data and information, the primary objective in data visualization is to gain insight into an information space, and Information Visualization is for data mining and knowledge discovery [6]

C. Dashboard

Dashboards are broadly defined as “a visual display of data used to monitor conditions and/or facilitate understanding highlighting the various definitions that exist for the dashboard, while Slightly highlighting discrepancies in information that dashboard users would normally need to monitor [7]. The organization's complex data is turned into useful data and then executive analysts use these tools to analyze the data in depth to track the data and find out what is happening to it in real-time, leading to the cancellation of several reports that take a long time to analyze. Since charities are interested in providing analytical techniques that support productive families by increasing their profits, these tools have been highlighted to be used to analyze customer behavior [8]

1. Functional Features of Dashboard Button
Years ago, software vendors, for example, Microsoft, and JasperSoft, participated in developing leading-edge dashboard solutions. The vendor claims that the use of dashboards will improve business performance in terms of increasing customer satisfaction, return on investment, and increasing cash flow. The dashboard includes three (key) features as the most important to include in it: search using filters to show more details for dashboard interactivity where browsing performance is configured in individual visualization, scenario analysis and presentation flexibility.
2. Predictive Analysis:

Predictive data analysis “is a branch of advanced data analysis used to make predictions about unknown future events”. Predictive analytics uses statistical models and predictive techniques to understand the future or fill in information we don't have

3. Prescriptive Analytics:

Prescriptive data analysis "is a branch of data analysis that uses the application of computational science to optimize the set of decisions that a person has to make in a given situation" Prescriptive analytics is considered the most valuable part of data analytics because it can be used to recommend specific decisions that we have to make in order to achieve a result. desired business

D. Google Data Studio

Launched in May 2016 as part of Google's paid Analytics 360 suite, Google Data Studio is a new data visualization program designed as an easy-to-use tool to represent complex data sets in an attractive and clear way. In August 2016, Google made this program free to the public. Data Studio is still in beta release; the third-party features and integrations reviewed here are subject to change, but are effective as of August 2017. Data Studio's core functions are dashboard-style visual interpretation of social media and web analytics such as Google AdWords and YouTube analytics; however, the support of tools such as MySQL and Google Sheets suggests that the program can be used by researchers to interpret their own data in an equally attractive and user-friendly format [9].

Google Data Studio allows users to:

1. Connect to the data source,
2. Create custom calculations, dashboards and reports,
3. Share and collaborate with others
4. This product offers templates and a gallery of sample reports (developed by the community) users can take advantage of instead of starting from a blank page. Some of them are quite visually appealing. Based on the author's observations from various sources, there are 4 main strengths of Google Data Studio[10]:
 1. Price (Free)
 2. Integrated with Google Platform
 3. Cloud Based
 4. Provide sample report for users to get started.

E. Metode CRISP

CRISP provides a standard nonproprietary and freely available process for incorporating data mining into the general problem solving strategy of a CRISP business or research unit, having a life cycle consisting of six stages, as illustrated in Figure 1. Note that the phase sequence is adaptive. That is, the next phase in the sequence often depends on the results associated with the previous phase. The most significant dependencies between the phases are indicated by arrows. For example, suppose we are in the

modeling phase. Depending on the behavior and characteristics of the model, we may have to return to the data preparation phase for further refinement before moving on to the model evaluation phase. The iterative nature of CRISP is denoted by the outer circle in Figure 1.

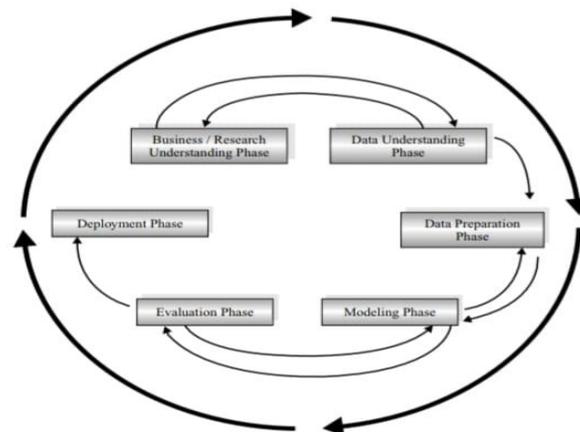


Figure 1. CRISP is an iterative adaptive process.

Often, the solution to a particular business or research problem leads to further interesting questions, which can then be attacked using the same general process as before. Lessons from past projects should always be taken as input into new projects. The following is an outline of each phase. While it is possible that problems encountered during the evaluation phase may send the analyst back to one of the previous phases for improvement, for simplicity we only show the most common loops, returning to the modeling phase [11]

III. METODOLOGI

The methodology for working on data visualization in this study is to fulfill the desired objectives, a flow is made in the stages of the research to be carried out. This study uses the following CRISP-DM methods:

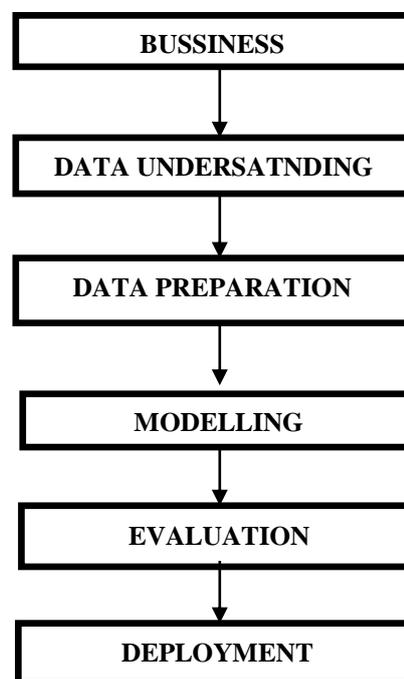


Figure 2 Flow in Research Stages

The stages in Figure 2 are the flow in this research:

1. Business understanding

This stage can be called the research understanding stage which includes the objectives and requirements of the project.

2. Data understanding

This stage is carried out by collecting data using exploratory data analysis to familiarize oneself with the data and find initial insights, evaluating the quality of the data.

3. Data Preparation

The data preparation is to prepare the initial raw data for the final data set that will be used for all subsequent stages. In this stage, select the desired cases and variables, analyze the appropriate ones for analysis. Performing transformations on specific variables, if needed, cleans up the raw data so that it is ready for modeling tools. The data is processed using Ms. Excel.

4. Modelling ,

This phase is done by selecting and applying appropriate modeling techniques. The database that has been created must be able to connect with the tools that will be used to create visualizations. The tools used in this research is Google Data Studio.

5. Evaluation

This phase sees the suitability of the dashboard that has been made with the initial needs. If the initial objectives are met, the evaluation stage is declared successful.

6. Deployment

This phase, if the existing data is clean, then the dashboard can be made. The type of diagram used will adapt to the needs of the organization. If necessary, calculations will be made with special formulas to be able to visualize certain things.

IV. IMPLEMENTATION

The implementation of this research is several visualizations with Google Data Studio from the published data of scientific work of the Master of Management IIB Darmajaya lecturers and the display of the location of the Master of Management lecturers of IIB Darmaja studying. Several types of charts used in Google Data Studio are bar charts, bubble maps, charts and tables, plus filter controls

A. Dashboard Title Pages and Google Solar Indexed Scientific Works

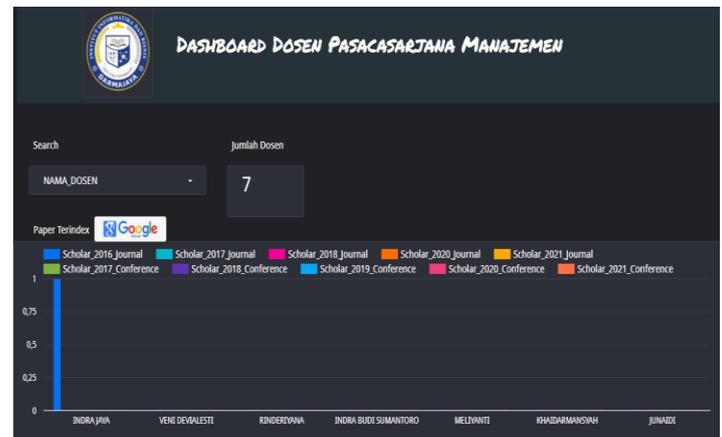


Figure. 2. Google Scholar Indexed Title Page and Scientific Work Dashboard

The dashboard above provides information on the scientific work of each lecturer who submits Google Scholar indexed journals every year. The results of the implementation show one lecturer who submitted journals in 2017.

B. Display of Scientific Work of Lecturers Indexed by Scopus every year

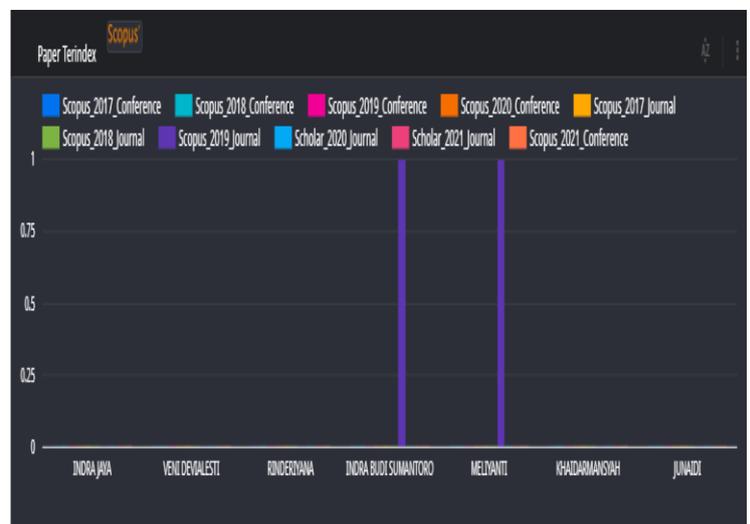


Figure 3. Scopus Indexed Scientific Work Dashboard

The dashboard above provides information on the scientific work of each lecturer who submits Scopus indexed journals, both journals and conferences every year. The results of the implementation show two lecturers who submitted journals in 2019 as many as 2 journals. In 2020 2 lecturers submitted 3 journals this year because lecturers on behalf of Indra Jaya publish in the same year.

B. Display of WOS Indexed Lecturer Scientific Work per year



Figure 4. WOS Indexed Scientific Work Dashboard
The results of the implementation can be seen that there are no lecturers who submit journals indexed to WOS.

C. Display of Lecturer's Scientific Work Summary



Figure 5. Dashboard of Lecturer's Scientific Work Recapitulation

The Dashboard above provides information on the number of lecturers' scientific works that have been published in the period 2017 to 2021.

D. Display of Locations of Lecturers Undergoing Education



Figure 6. Dashboard of Lecturers' University for Bachelor's Education



Figure 7. Dashboard of Lecturers' University for Masters Education



Figure 8. Dashboard of Lecturers' University for Doctoral Education

Dashboard Figures 6, 7, and 8 provide information on the educational history of management masters lecturers which are explained with university diagrams for studying from bachelor to doctoral

V. CONCLUSION

This research has succeeded in displaying data visualization of lecturers' scientific publications based on citation indexes so as to help leaders evaluate lecturers' performance. The data sources used in this data visualization system with Google Data Studio are stored in Google Sheets. Data is collected from Google Scholar, Scopus, and WOS sites. This study also presents historical data on lecturers' education by presenting university lecturers from the Master of Management program who are currently studying. However, in this study there are still many shortcomings that are expected to be carried out further research. The use of this research data is not enough so that the pattern formed on the diagram is not good enough.

ACKNOWLEDGMENT

We would like to thank our class 3MTI friends for their support and cooperation.

REFERENCE

- [1] P. RI, *Undang-Undang-Nomor-14-Tahun-2005*. 2005.
- [2] F. N. Hasan, "Implementasi Sistem Business Intelligence Untuk Data Penelitian di Perguruan Tinggi," *Pros. Semin. Nas. Teknoka*, vol. 4, no. 2502, pp. I1–I10, 2019, doi: 10.22236/teknoka.v4i1.3943.
- [3] S. A. Fathurrahman, Ahmad Samsul Irfan AKbar, "Perancangan sistem informasi publikasi dan penelitian dosen," *Publ. Res. Inf. Syst.*, vol. 5, no. 2, pp. 149–158, 2018.
- [4] Soleh, M. A. Dewi, Arfiah, and Asdin, "Metode Peninjauan Dashboard Dari Business Intelligence

- Untuk Membuat Keputusan Lebih Baik," *Semin. Nas. Teknol. Inf. dan Multimed.*, pp. 13–18, 2013.
- [5] X. Li, A. Kuroda, H. Matsuzaki, and N. Nakajima, "Advanced aggregate computation for large data visualization," *IEEE Symp. Large Data Anal. Vis. 2015, LDAV 2015 - Proc.*, pp. 137–138, 2015, doi: 10.1109/LDAV.2015.7348086.
- [6] R. Toasa, M. Maximiano, C. Reis, and D. Guevara, "Data Visualization Techniques for real-time information - A Custom and Dynamic Dashboard for Analyzing Surveys' Results," *2018 13th Iber. Conf. Inf. Syst. Technol.*, pp. 1–7.
- [7] M. Elshehaly *et al.*, "QualDash: Adaptable generation of visualisation dashboards for healthcare quality improvement," *IEEE Trans. Vis. Comput. Graph.*, vol. 27, no. 2, pp. 689–699, 2021, doi: 10.1109/TVCG.2020.3030424.
- [8] S. Tanko, H. Al-Saeed, R. Alali, S. Alawami, S. Brahimi, and G. Kirishina, "Performance dashboard for productive families," *2nd Int. Conf. Comput. Appl. Inf. Secur. ICCAIS 2019*, pp. 1–4, 2019, doi: 10.1109/CAIS.2019.8769481.
- [9] G. Snipes, "Product Review Google Data Studio," *J. Librariansh. Sch. Commun.*, vol. 6, no. 1, p. 5, 2018.
- [10] D. Fernando, "Data Visualization Using Google Data Studio," *Natl. Semin. Inf. Technol. Eng.*, vol. 1, no. November, pp. 71–77, 2018, [Online]. Available: <https://ejournal.lppmunsera.org/index.php/snartisi/issue/view/100>.
- [11] T. Daniel, *An Introduction to Data Mining*. .