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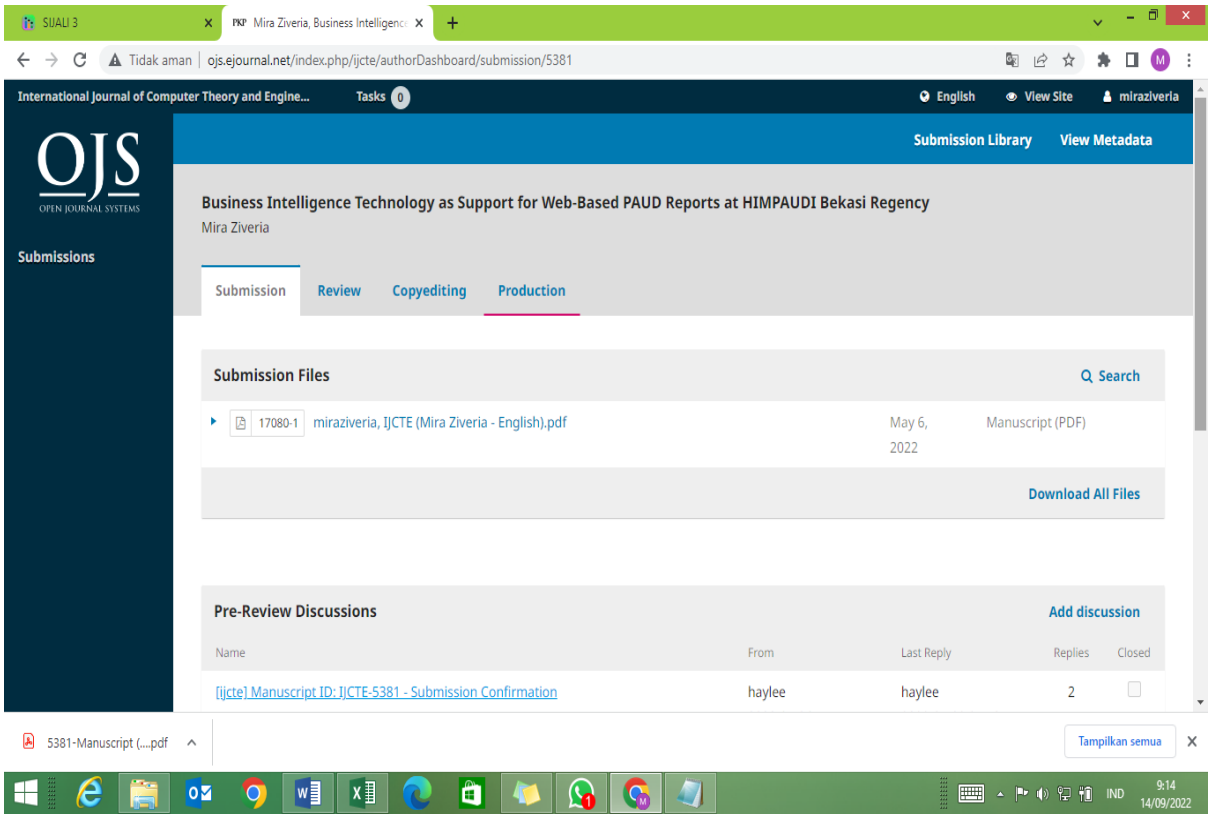

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Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

Mira Ziveria, Lufty Abdillah, and Salman

***Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini* (Association of Early Childhood Educators and Personnel of Education or HIMPAUDI) of Bekasi Regency is a group of 1680 entities of *Pendidikan Anak Usia Dini* (Early Childhood Education Programs or PAUD) spread across 23 sub-districts, 187 villages and 176 villages. HIMPAUDI Bekasi Regency strives to realize the application of computer technology to evaluate routine reports from PAUD educational institutions every month. At this time there are still many obstacles in processing reports into a form that is easy to understand. This study aims to build a computer-based system in reporting activities at HIMPAUDI Bekasi Regency which is useful for making it easier for each PAUD to send reports to the Regency HIMPAUDI, making it easier for District HIMPAUDI to monitor and recap all reports, and facilitate the analysis of HIMPAUDI reports for Bekasi Regency. The report system built is a web-based system that uses Business Intelligence technology to analyze reports so that reports uploaded in the form of excel files can be automatically recapitulated by the system into graphs that can be viewed based on parameters such as year, age, study group, and so on. The website development method uses the System Development Life Cycle (SDLC) which starts with data collection, system analysis and design, implementation, testing and system maintenance. The result of the research is a web-based Busisness Intelligence application to support PAUD reports in Himpaudi Bekasi Regency which is submitted and then managed by Himpaudi of Bekasi Regency.**

***Index Terms*—Business Intelligence, reports, SDLC, web.**

I. Introduction

In this section, the researcher explains the background, problem formulation, objectives, and benefits of this research.

Manuscript received October 9, 2001. (Write the date on which you submitted your paper for review.) This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here). Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Nd–Fe–B"). Do not write "(Invited)" in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors' initials.

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A. Background

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. The HIMPAUDI Secretariat of Bekasi Regency is located at Jalan MT.Haryono No.26, Taman Rahayu Village, Setu District, Bekasi Regency, West Java Province. The number of PAUD in Bekasi Regency is 1,680 PAUD consisting of 976 TK/RA (kindergarten/raudhatul athfal), 574 KB (playgroup), 14 TPA (child care), and 116 SPS (similar PAUD unit) [1].

HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports.

HIMPAUDI of Bekasi Regency strives to realize the application of computer technology to recapitulate routine reports from PAUD educational institutions every month. It takes a system that can accommodate these reports in a practical and efficient manner in obtaining the results of report analysis and reports can be presented in a neat and attractive manner. Reports that are routinely sent every month include student, teacher, and personeel data. Student data sent includes identity, class, last month's student condition, current month's student condition, attendance, PAUD facilities and infrastructure, and others. Teacher and personeel data includes identities such as last education, status, decree, years of service, attendance, and others.

The problem in the research is how to build an application that applies Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency so that it can make it easier for every PAUD to send reports to HIMPAUDI, HIMPAUDI is easy to monitor, recapitulate, and reports uploaded in excel files can be recapitulated automatically. automatically by the system into a graphical form that can be viewed based on the desired parameters?

The specific purpose of this research is to build a web-based application by applying Business Intelligence technology to support PAUD reports at HIMPAUDI of Bekasi Regency with the SDLC development method which will later be submitted and implemented and managed by HIMPAUDI of Bekasi Regency so that the process of monitoring report recapitulation can be processed by the system with good processing quality, reducing error rates, saving time and costs, and helping the performance of HIMPAUDI of Bekasi Regency.
Researchers under the auspices of the Institut Teknologi dan Bisnis Kalbis have collaborated with HIMPAUDI of Bekasi Regency since 2016 for research activities and community service. Based on observations and analysis results, researchers can identify the needs of partners, one of which is a problem in reporting data from PAUD throughout Bekasi Regency, which number in the thousands to HIMPAUDI Regency every month. In 2019 researchers conducted research on PAUD data reporting at HIMPAUDI of Bekasi Regency by building a website whose one function was to support data reporting, but the resulting system did not help much because the report was not analyzed by the system, making it difficult to understand.

Based on this, in this research proposal, the researcher tries to use Business Intelligence technology so that PAUD reports uploaded in excel files can be recapitulated automatically by the system into graphic form that can be viewed based on the desired parameters such as year, age, study group, and so on. .

B. Formulation of the Problem

Based on the above background, the formulation of the problem in this research is how to build a system by utilizing Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency?

C. Limitation of the Problem

Limitations of the problem in this research are:

1. The research was conducted in HIMPAUDI of Bekasi Regency, therefore the system design was adapted to the current condition of Himpaudi.
2. Development of a website as a means of conveying HIMPAUDI information including profiles, agendas, news, data, and the Himpaudi secretariat.
3. Development of a website as a means for reporting PAUD to HIMPAUDI covering data on students, educators and education staff, as well as facilities and infrastructure.

D. Purposes of Research

The purpose of this research is to produce a web-based system for HIMPAUDI of Bekasi Regency which is managed by HIMPAUDI of Bekasi Regency administrators to be used by PAUD to provide reports to HIMPAUDI, can be monitored by HIMPAUDI of Bekasi Regency and can be recapitulated automatically by the system into a graphic form that can be viewed based on parameters by applying Business Intelligence technology with the System Development Life Cycle (SDLC) method and using the PHP programming language and MySQL database as well as XAMPP and Tableau software.

E. Benefits of Research

The development of the Bekasi Regency HIMPAUDI website can provide the following benefits:

1. For HIMPAUDI of Bekasi Regency, among others: (a) HIMPAUDI management can publish information related to their agencies through the website, (b) HIMPAUDI management can monitor and obtain PAUD reports, and can automatically recapitulate through the system into a graphic form that can be viewed based on several parameters, (c) PAUD administrators at the sub-district level can easily report to district-level administrators through the system.
2. For the community, among others: (a) Get information quickly and easily about HIMPAUDI of Bekasi Regency, (b) Educate the public to be able to find information about HIMPAUDI through the website.

II. Literature Review

In this section, the researcher explains the theory, perspective, literature review and previous research related to the topic of this research.

A. Early Childhood Education Programs

Early childhood education programs is one of the coaching efforts aimed at children from birth to the age of six which is carried out through the provision of educational stimuli to shape physical and spiritual growth and development so that children have readiness to enter further education levels. In Law No. 20 of 2003 concerning the National Education System, it is explained that what is included in early childhood education in the formal education pathway is TK (kindergarten), *Raudhatul Athfal* (RA) or an equivalent form, while what is included in education is early childhood through non-formal channels such as *Kober* (playgroups), TPA (Child Care) or similar PAUD units [2].

HIMPAUDI is an independent organization that brings together elements of early childhood educators and education personnel. Association of Early Childhood Educators and Personnel of Education or abbreviated HIMPAUDI (*Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini*) is a professional organization that houses non-formal PAUD educators and education personnel. HIMPAUDI has

the duty and role to facilitate PAUD educators in developing all their potential, especially in terms of developing their competence as PAUD educators so that they are able to provide educational services for early childhood optimally in accordance with what is stated in HIMPAUDI's vision, namely realizing educators and education personnel for young children. strong, professional, and noble character [3].

B. Reports

One of the important points in this research is how to process and integrate a report. The following is the definition of a report according to several experts: A report is a form of presenting facts about a situation or activity. The facts presented relate to the responsibilities assigned to the reporter [4].

According to Rakesh TK, "Reporting Solution is to deliver and implement a consistent, personalized information delivery system that includes performance data (key performance indicators) which are relevant, accurate and transparent for use by regional management and executives to enable decision making each month [5].

Can be interpreted as, a report is a collection of data in which it is formed based on relevant, accurate and transparent KPIs (key performance indicators) to be used by management or executives in making decisions on a monthly basis. Report types can be grouped based on a certain time, namely Regular/Periodic Reports, Special/Exception Reports, Unscheduled Reports, Special Analysis Reports, Process Inquiry Reports [6].

C. Basic Concepts of Information Systems

The system is a network of interconnected procedures and procedures that gather together to carry out an activity or complete a certain target [7].

The system is the elements that are interrelated and work together to process the input or input addressed to the system and process the input to produce the desired output or output. The elements contained in the system include: [8]

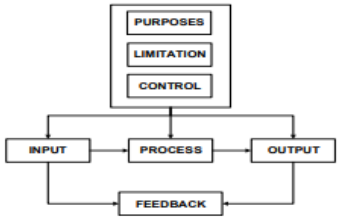


Fig. 1. Element of System

Based on the theory that has been put forward, researchers can conclude that the system is an element that is interconnected to achieve a certain goal. From Figure 3 above, it can be explained that the objectives, limitations and control of the system will affect the process input and output. Inputs that enter the system will be processed and processed to produce output. The output will be analyzed and will become feedback for the recipient and from this feedback will emerge all kinds of considerations for further input. Furthermore, this cycle will continue and develop according to the existing problems.

Data that is processed through a model becomes information, the recipient of the information then receives the information, makes a decision and takes action, resulting in another action that makes some data back. The data is inputted, reprocessed through a model and so on to form a cycle. This cycle by John Burch is called the information cycle [7].

Information is a collection of data or facts that are organized in a certain way so that they have meaning for the recipient. The quality of information depends on three things, namely the information must be accurate, timely, and relevant. An information system is a system within an organization that brings together the daily transaction processing needs that support managerial organizational operations functions with strategic activities of an organization in order to be able to provide certain outside parties with the necessary reports. Information system components include input, model, output, technology, database, and control [9].

D. Web-Based Information System

A web-based information system is an information system that uses web or internet technology to support and facilitate human work to become more efficient. Because a web-based information system uses the help of the internet or web-based applications, it means that there are things that must be met to create this web-based information system such as HTML, CSS, Javascript web programming languages, the use of web servers, for example, the Apache web server and also a data storage warehouse or database. which you can create using Oracle or MySQL. The requirements for the formation of a website are:

1. Availability of Web Server, either static or dynamic web. If you want to be online on the internet, the first requirement must be to have a server, both hardware and software. Hardware is a set of computers that are always connected online to the internet. For software, apart from the operating system, software for the web server itself must also be provided. For now, the favorite web server is Apache.
2. Availability of Server-Based Web Programming Software. If you want to create a web, it means that a web programming language other than HTML must be available, both client side and server side. For the client side, it has a drawback that the program instructions can be seen by internet users. While the server side is more secure because the program instructions are not visible to the user, what is visible is like ordinary HTML. An example of a favorite web programming language is PHP.
3. Availability of Databases. Database is software used to store and manage data. If you have a little data, maybe you can still use ordinary files as storage media. But if the data is already very much, without a database it will be very complicated. Databases can store millions of data and can be accessed very quickly. Examples of databases that can be used to create a web are Oracle, MySQL, and many others. The database that will be used by the author is MySQL.

E. System Development Life Cycle (SDLC)

SDLC is a pattern taken to develop a software system, which consists of the following stages: system planning (planning), analysis (analysis), design (design), implementation (implementation), testing (testing) and management (maintenance). In software engineering, the concept of SDLC underlies many types of software development methodologies. SDLC stages are as follows [10]:

1. System planning system (planning), more emphasis on aspects of the feasibility study of system development (feasibility study).
2. System Analysis (analysis). The project objectives refine into defined functions and operations of the intended application. Analyze the end user required information.
3. System Design (design). Describes the desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudo and other documentation.
4. System Implementation (implementation). Implement the design from the previous stages and conduct trials.
5. System testing (testing), namely testing the system that has been made.
6. System Management (maintenance). It is carried out by the appointed admin to keep the system able to operate properly through the system's ability to adapt itself according to needs.

F. User Acceptance Test (UAT)

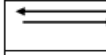
UAT is a testing process carried out by the user with the output of a test result document that can be used as evidence that the software has been accepted and has met the requested requirements. The UAT is not much different from the questionnaire in the early stages of making the application.

UAT is a verification process that the solution created in the system is suitable for the user. This process is different from testing the system (making sure the software doesn't crash and conforms to the user's request documents), but rather making sure that the solution in the system will work for the user, testing that the user accepts the solution in the system. UAT is generally performed by the client or end user, usually focusing not on the identification of simple problems such as spelling errors, nor on howstopper defects, such as software crashes. Testers and developers identify and fix these problems during the early stages of functionality testing, during integration testing and at the system testing stage [10].

G. Data Flow Diagram (DFD)

DFD is a diagram that uses notation to describe the flow of data in a system, whose use is very helpful for understanding the system logically, structured and clearly. DFD can also be used as a tool in describing or explaining the work process of a system. DFD is a system design tool that is oriented to the flow of data with a decomposition concept that can be used for describing analysis and system design that is easily communicated by system professionals to users and program makers. There are 3 levels of DFD, namely Context Diagram, Zero Diagram (Level 1 Diagram), and Detailed Diagram [8].

TABLE I: Data Flow Diagram Notation

SYMBOL	REMARKS
	*External Entity* is a unit (entity) in the system environment which can be in the form of people, organizations or other systems in the external environment that will provide input or output from the system.
	*Data Flow* shows the flow of data which can be input to the system or the results of system processes
	*Process* are activities or work carried out by people, machines or computers from the results of a data flow that enters the process to produce data flows that will come out of the process.
	*Data Store* is from data that can be in the form of a database on a computer system, an archive, manual notes, an agenda, or a book

H. Entity Relationship Diagram (ERD)

In the ERD model, the universe of data that exists in the real world is translated by utilizing a number of conceptual tools into a data diagram, which is generally referred to as an Entity-Relationship Diagram (E-R Diagram). The Entity-Relationship model is formed from two components, namely entities (entities) and relationships (relation). These two components are further described through a number of attributes. ERD was first described by Peter Chen which was created as part of the CASE software. The notations used in ERD are entities, relationships, attributes and lines [11].

I. Business Intelligene (BI)

BI is a collection of techniques and tools for transforming raw data into useful and meaningful information for business analysis purposes. BI technology can handle huge amounts of unstructured data to help identify, develop, and otherwise create new business strategic opportunities. The purpose of BI is to facilitate the interpretation of this large amount of data. Identifying new opportunities and implementing an effective strategy based on insights can provide a business with a competitive market advantage and long-term stability. [12]

J. Dashboard System

Dashboard is an application that serves to display performance-related information for company managers. The dashboard concept has been around for years and has been adopted by many companies around the world. Dashboard is a visual representation containing important information needed to achieve goals and can be arranged on one screen so that it will be easier for users to monitor it. Meanwhile, the information dashboard is a visual display containing

important information needed to achieve goals by organizing information on one screen so that organizational performance can be monitored [13].

There are three types of dashboards, namely:
1. Strategic Dashboard

Strategic dashboards are useful to support strategic level management in obtaining information to make business decisions, predict opportunities, and provide direction in achieving strategic goals.

2. Tactical Dashboard

Tactical dashboards focus on the analysis process to determine the cause of a particular condition. This dashboard serves to measure short-term productivity and effectiveness whose results are often used by individual contributors.

3. Operational Dashboard

Operational dashboards are useful to support monitoring of specific business process activities in their daily life. This dashboard measures the short-term effectiveness of specific business functions at the team or business unit level.

K. Tableau

Tableau is a tool that can facilitate the creation of interactive visual analysis in the form of a dashboard. Another definition of Tableau is that Tableau is software that supports collaborative data visualization for someone who works in analyzing business information. From the two definitions above, it can be concluded that Tableau is software that can process data into an attractive visual. That way, the data set will be easier to understand. Tableau has various advantages that can be taken into account when visualizing data in the form of graphs or dashboards. Some of Tableau's advantages include interactive visual options, user friendly, processing multiple data sources, mobile friendly dashboard, and integration with scripting languages. Tableau combines SQL in the database with a descriptive language to create graphs and creates a database visualization language called VizQL. The version used by the researcher is Tableu Public which is free and can be used by anyone. [14]

L. Previous Researchs

In this sub-chapter, previous research that is relevant to the research conducted by the researcher will be discussed. The results of the researcher's observations regarding "Development of the Bekasi Regency Himpaudi Website as Support for PAUD Reporting" have never been carried out, but there are several similar topics that have been carried out, including the following:

1. "Aplikasi *Intelligence Website untuk Penunjang Laporan PAUD pada HIMPAUDI Kota Tangerang*" by Dina Fitria Murad, Nia Kusniawati, and Agus Asyanto from STMIK Raharja that published in the CCIT Journal Vol.7 No.1 September 2013 [15].
2. "Web Information Monitoring for Competitive Intelligence" by Bing Tan, Schubert Foo, and Siu Cheung Hui from School of Computer Engineering, Nanyang Technologycal University, Nanyang Avenue, Singapore that published in the International Journal Cybernetics and System Vol.33, November 2010 [16].
"*Perancangan Sistem Penyajian Laporan Realisasi Anggaran pada Badan Pusat Statistik Kota Tangerang*" by Sudi Hartati from STMIK Raharja in 2009 [15].

III. Research Metodology

The method of collecting data in this study was to conduct interviews with several PAUD and HIMPAUDI administrators in Bekasi Regency and make direct observations to see the implementation of reporting and also how HIMPAUDI disseminates information to PAUD and the community regarding the profile and activities carried out by HIMPAUDI or PAUD. Observations were made on August 1 and 17 2018 and took place at PAUD Pelita Rahayu, Setu District, which is the Secretariat of HIMPAUDI, Bekasi Regency and SPS Bhakti Pertiwi, Tambun Selatan District, Bekasi Regency.

Based on interviews and observations made by researchers, researchers obtained information about the general description of HIMPAUDI of Bekasi Regency. The general description of HIMPAUDI contains a profile that includes the vision and mission, activities, management, organizational structure, as well as examples of reports that must be made and sent from PAUD to HIMPAUDI Regency which is carried out every month.

The website system development method in this study uses the System Development Life Cycle (SDLC) method starting from planning, analysis, design, implementation, testing and maintenance.

Fig. 2. Stages of System Development Life Cycle

Details of activities for each SDLC stage carried out in the study can be seen in Table 2.

TABLE II: Stages of Research

Stages of Research	Activites
System Planning	• PAUD and HIMPAUDI • Scope of HIMPAUDI of Bekasi Regency • Vision, Mission and Goals HIMPAUDI of Bekasi Regency • Organizational Structure of HIMPAUDI of Bekasi Regency • Secretariat of HIMPAUDI of Bekasi Regency
System Analysis	• Data Reporting from PAUD Village /Ward to HIMPAUDI of Bekasi Regency • Recapitulation of PAUD reports to HIMPAUDI of Bekasi Regency • Information Dissemination from HIMPAUDI Bekasi Regency to the Village/Ward Level • Weaknesses of the Running System • Feasibility study • System Functional Requirements Analysis • Analysis of Non-Functional System Requirements
System Design	• Context Diagram • Data Flow Diagrams (DFD) Level 1 and 2 • Database Design (Entity Relationship Diagram and Physical Data Model, Table Structure) • Interface Design • Hardware and Software Design
System Implementation	• Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor • Implementation of Data Visualization with Tableau • Database Implementation with MySQL
System Testing	• Testing using free Web Hosting with black box testing
System Management	• Rent Web Hosting and Domain • Upload to Web Hosting • System Usage Guide • Submission of the website to HIMPAUDI Bekasi Regency

This research activity was conducted at Institut Teknologi dan Bisnis Kalbis, Jalan Pulomas Selatan Kav.22, East Jakarta. This research was conducted for one year, starting from October 2020 to September 2021.

IV. Result and Discussion

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. An overview of the scope of HIMPAUDI in Bekasi Regency which oversees PAUDs in Village / Ward in Bekasi Regency can be seen in Figure 3.

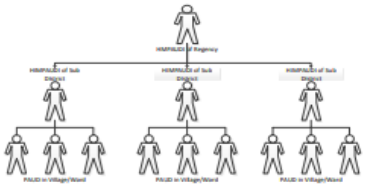


Fig. 3.Scope of HIMPAUDI of Bekasi Regency

The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports. The types of reports that are routinely sent from each PAUD to the sub-district level and continued to the district level are reporting:

1. Report of Student Data
2. Report of Educator and Personeel of Education.

The process of reporting PAUD from Village/Ward to HIMPAUDI Center (HIMPAUDI of Bekasi Regency) can be seen in Figure 4.

Fig. 4. Report of PAUD to HIMPAUDI of Bekasi Regency

An example of a student data reporting form from PAUD at the village/ward level to the sub-district level can be seen in Figure 5 and an example of reporting data on educators and education personnel from PAUD at the village/ward level to the sub-district level and from the sub-district to the district level can be seen in Figure 6.

Fig. 5. Report of Student Data from PAUD in Village/Ward to HIMPAUDI in Sub-District

Fig. 6. Report of Educator and Personeel of Education in Sub-Dustrict to District Level

Dissemination of information such as news, agenda, and data from HIMPAUDI Bekasi Regency to the Village/Ward Level or to the wider community is carried out in several ways and the media. The method is carried out such as holding a meeting or meeting by inviting the chairperson, operators, educators and education staff to the District HIMPAUDI Secretariat. The media used are sending letters, brochures, banners, email, telephone, whatsapp messages, and others.

Fig. 7. Dissemination of Information HIMPAUDI of Bekasi Regency

In terms of disseminating information such as news, agendas, and data from HIMPAUDI of Bekasi Regency to the Village/Ward Level or to the wider community using media such as sending letters, brochures, banners, emails, telephones, whatsapp messages on the current system, the weaknesses are:

1. If using email, the HIMPAUDI operator at the Regency level must send it to all email addresses of all operators or leaders. This requires precision and a long time.
2. If you use a letter, it will take a long time to arrive at the Village/Ward level and also requires a mail delivery fee.
3. If using a banner, the range of information conveyed is limited only to people who see the banner. So with banners it is difficult to reach all PAUD in Bekasi Regency.
4. If you use a phone and whatsapp message, it will take a long time because you have to call all PAUD in Bekasi Regency.
5. Does not have an effective and efficient forum to convey information about profiles, agendas, news, and data from HIMPAUDI of Bekasi Regency to PAUD under it and the general public.

In terms of reporting data on students, educators, and education staff from PAUD at the Village/Ward level to the sub-district level and continued to the district level using an excel file that is printed and sent to the current system, the weaknesses are:

1. It takes a long time for the process of sending reports from PAUD at the Village/Ward level to arrive at HIMPAUDI District.
2. It takes a long time to process data recording at the sub-district level because it must accumulate all data from the village/ward level PAUD.
3. The accuracy of reporting data and data recapitulation at the sub-district level is not guaranteed because they have to manually recap reports from PAUD-PAUD at the Village/Ward level.
4. Does not have an effective and efficient forum for reporting data on students, educators, and education staff from PAUD at the Village/Ward level to HIMPAUDI, Bekasi Regency.

Based on observations made by researchers in the field, it can be seen that this research has never existed in the HIMPAUDI environment of Bekasi Regency. Based on the results of interviews conducted by researchers with the Head of HIMPAUDI of Bekasi Regency, Secretary Himpaudi Bekasi Regency, and several PAUD chairpersons and operators in Bekasi Regency, research to build the Bekasi Regency HIMPAUDI website using business intelligence technology to support PAUD reporting has never been carried out and is very feasible for realized because the system that the researcher will do is one solution to increase the speed and accuracy of delivering information from HIMPAUDI Regency to the Village/Ward level and also for reporting data from PAUD Village/Ward to HIMPAUDI Regency to be more effective and efficient.

Functional requirements are requirements that must be met so that a system can run as expected. The functional requirements that must exist on the Bekasi Regency Himpaudi website to be developed are described in Table 4.

TABLE III: System Functional Requirements

User	Functional Requirements
HIMPAUDI Regency	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as HIMPAUDI Regency operator
	• Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of graphs, namely dashboards for personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from sub-district and sub-district early childhood in pdf format • Can manage news to be published to sub-district, sub-district/village early childhood • Can manage agendas that will be published to sub-district, ward/village early childhood education • Can manage user access rights for village/ward, sub-district, and district levels
HIMPAUDI Sub- District	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and information on the Bekasi Regency HIMPAUDI secretariat • Can log in and log out as a sub-district HIMPAUDI operator • Can receive and monitor recap reports from sub-district early childhood education in graphic form, namely dashboard of personeel attendance, student attendance, furniture, and facilities based on required parameters • Can receive and monitor the recap of reports from the PAUD of Village/Ward in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from the PAUD of Village/Ward in pdf format • Can provide news proposals to district preschools for publication • Can receive information published by district preschools, including profiles, agendas, news, and downloadable data
HIMPAUDI Ward/Village	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as a sub-district/village HIMPAUDI operator • Can send reports to sub-districts and districts in the form of student attendance data, personeel attendance, furniture and facilities data • Can provide news proposals to district preschools for publication
General Public	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency

Non-functional requirements include hardware requirements and software requirements. The hardware that will be used is utilizing the hardware already owned by HIMPAUDI operators and the community. HIMPAUDI operators include operators at the institutional, sub-district, and district levels. The number and specifications of the hardware owned already support the operation of the designed system. While using manual reporting using an excel file, the operator is already using a computer or laptop whose specifications vary.

The hardware that can be used in the system made are: (1) PC, (2) VGA monitor has a minimum resolution of 800 x 1200 pixels, (3) Keyboard and mouse to perform user activities, (4) Internet broadband, (5) All the hardware used is a standard device in a computer system as well as for internet connections.

The software used in this research process as follows: (1) Hardware in the form of a computer set with specifications Processor Intel® CORE™ i5-2450M, CPU @ 2.5 GHz, 4.0 GB RAM, (2) Software in the form of Microsoft Windows 8, Microsoft Office 2010, Notepad++ application as a text editor, MySQL as database software, XAMPP server as a web server, Microsoft Visio software for creating flowcharts, and Star UML Diagram software for designing UML diagrams.

User analysis is intended to find out which users are involved in using the HIMPAUDI website so that the level of user understanding of computers can be known. System users are HIMPAUDI operators and the public. HIMPAUDI operators consist of 3 levels, namely institutional operators (village/ward level), sub-district level operators, and district level operators. The public are all people who want to get information about the profile, agenda, and news about HIMPAUDI.

TABLE IV: System Users

User	Access Rights	Classification
Admin (Operator of HIMPAUDI of Regency)	*Input* *Read* *Update* *Delete*	Have basic computer skills. Can operate Microsoft Windows operating system. Can operate internet access devices. Processing agendas, news and data to be uploaded or reported by HIMPAUDI Sub-districts and Institutions.
Operator of HIMPAUDI of Sub District	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Making news proposals, processing data reported by HIMPAUDI Institutions to HIMPAUDI of Regency
Operator of HIMPAUDI Institutions	*Input* *Read* *Update*	Have basic computer skills Can operate Microsoft Windows
		including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency

(Village/ Ward)	*Delete*	operating system Can operate internet access devices Make data reporting to HIMPAUDI of Regency Making news proposals, processing data reported by HIMPAUDI Institutions
Visitor (HIMPAUDI Operator and public)	*Read*	Can operate internet access devices Get information about the profile, agenda, news, and secretariat of HIMPAUDI

The system design stage is carried out after conducting a system analysis so that the new system can run well and as expected. Good design will be able to overcome problems that have occurred so far and anticipate possible errors in the future. In the system design sub-chapter, context diagrams, data flow diagrams, database design, interface design, and system test designs will be described.

To better explain the system input and output functions of each user involved in the system, a Context Diagram will be described as shown in Figure 8.

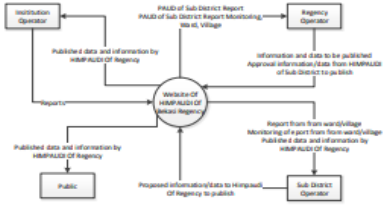


Fig. 8. Context Diagram

In the context of the diagram, it is illustrated that the HIMPAUDI of Bekasi Regency website is related to four external entities, namely the operator at the district operator who is responsible as an admin, the sub-district operator, the operator at the village and village level institutions, as well as website visitors, namely the community. Operators at the HIMPAUDI of Regency get a recap of reports from the system and get data on the results of monitoring reports from HIMPAUDI of Regency, and institutions from the system. Meanwhile, district operators can provide information and data to be published through the system and can give approval to proposed information or data sent from sub-districts and institutions. HIMPAUDI of Sub-District operators can provide information or data suggestions to be published in the system. HIMPAUDI of Sub-District can receive reports from sub-districts/villages, obtain monitoring data from sub-district and HIMPAUDI of Village/Ward reports, and obtain information and data published by HIMPAUDI of Regency. Sub-district and HIMPAUDI of Village/Ward operators can provide reports through the system and can receive information and data published by HIMPAUDI of Regency. The general public can receive information and data published by the HIMPAUDI of Regency.

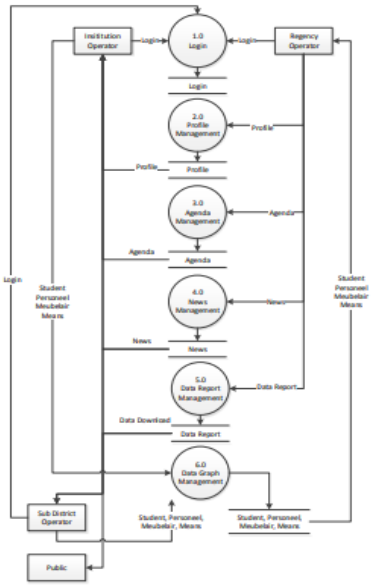


Fig. 9. Data Flow Diagram Level 1

In Figure 9 it can be seen that the HIMPAUDI of Bekasi Regency website consists of 6 main processes, namely Login/Logout, Profile Management, Agenda Management, News Management, Data Report Management, Data Graph Management.

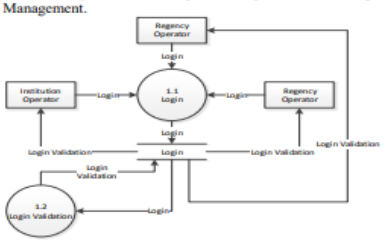


Fig. 10. Data Flow Diagram Level 2 Proses Login

In Figure 10 it can be seen that the Login Process consists of 2 processes, namely the Login Process and the Login Validation Process.

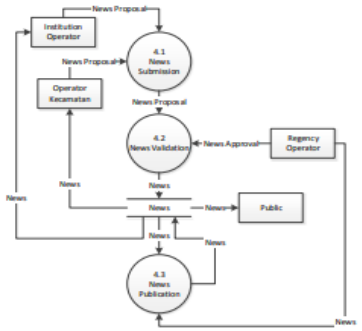


Fig. 11. Data Flow Diagram Level 2 - News Management Process

In Figure 11 it can be seen that the News Management Process consists of 3 processes, namely the News Receipt Process, the News Validation Process, and the News Publication Process.

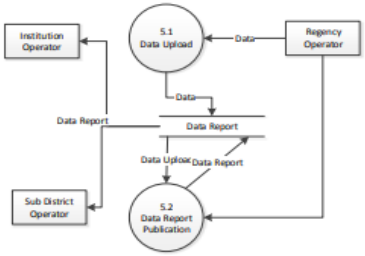


Figure 12: Data Flow Diagram Level 2 - Data Report Management Process

In Figure 12 it can be seen that the Data Management Process consists of 2 processes, namely the Data Upload Process and Data Report Publication.

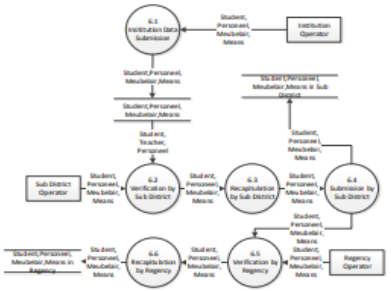


Fig. 13. Data Flow Diagram Level 2 - Process Data Graph

In Figure 13 it can be seen that the Data Graph Process consists of 6 processes, namely the Institutional Data Submit process, the District Verification process, the District Recap process, the District Submit process, the Regency Verification process, and the Regency Recap process.

Navigation structure is the structure or storyline of a program that is usually used to link web pages based on the elements used in web applications. The navigation structure used in this study is a hierarchical navigation structure. The navigation structure of website visitors is shown in Figure 14 as follows:

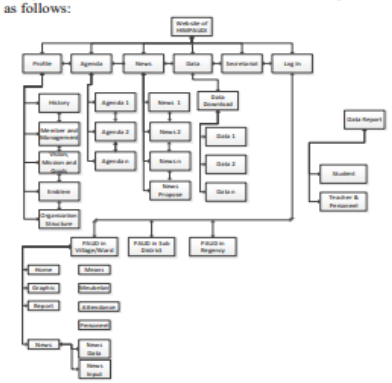


Fig. 14. Navigation Structure

In this section, a database design will be made using Entity Relationship Diagrams and table structures described by the Physical Data Model. ERD is made to facilitate analysis and subsequent designs. ERD design is made by displaying the

overall relationship between entities and the level of relationships between entities.

ERD describes database design at the conceptual level. Figure 15 illustrates the connectedness of entities on the HIMPAUDI of Bekasi Regency website.

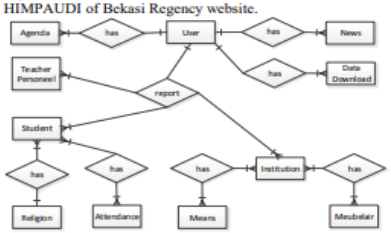


Fig. 15. Entity Relationship Diagram

Physical Data Model (PDM) describes database design at the physical level. Figure 16 illustrates the relationship between tables on the HIMPAUDI of Bekasi Regency website.

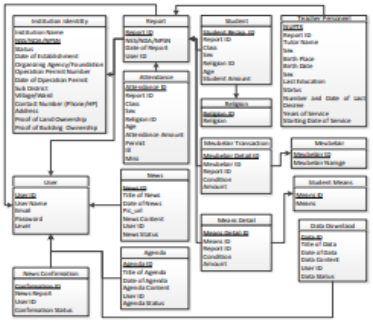
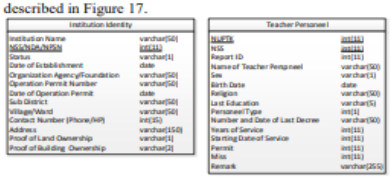


Fig. 16. Physical Data Model

The structure of the HIMPAUDI website database table is described in Figure 17.



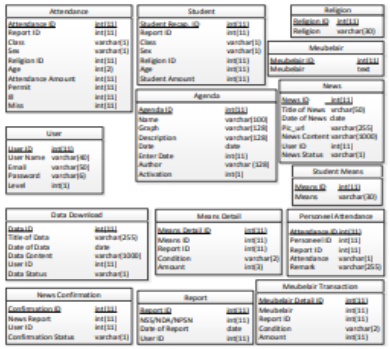


Fig. 17. Table Structure

Interface design or interface design is an important part of designing a system because the interface will relate directly to the user. Therefore, a good interface design and in accordance with aesthetics will make it easier for users to interact with the system to be developed. The design of the HIMPAUDI of Bekasi Regency website interface includes:

Fig. 18. Main Page Interface Design

Fig. 19. Data Reporting Page Interface Design

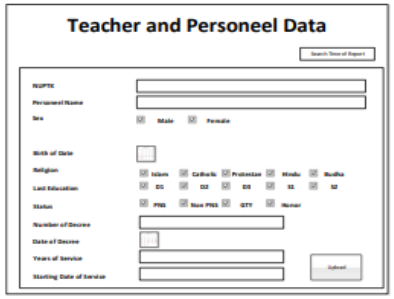


Fig. 20. Teacher and Personeel Data Page Interface Design

The HIMPAUDI website testing plan is carried out using black box testing, namely testing the functional system, with input given to the system whether it provides output as expected or not. Testing using localhost with the domain http://localhost/PAUD.

This stage is carried out to create a program by writing scripts using programming languages. Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor and data storage in MySQL.

Database implementation on phpmyadmin MySQL can be seen in Figure 21.

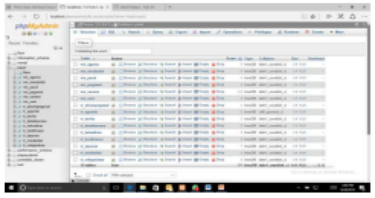


Fig. 21. Database Implementation

Implementation of the HIMPAUDI of Bekasi Regency website interface can be seen in Figure 22, Figure 23, Figure 24, Figure 25, Figure 26, Figure 27, and Figure 28.

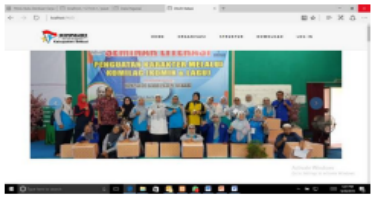


Fig. 22. Main Page Interface Implementation

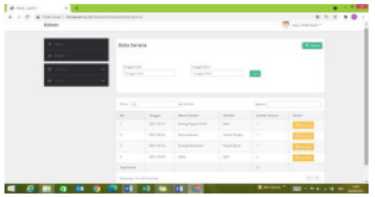


Fig. 23. Implementation of the Means Page Interface

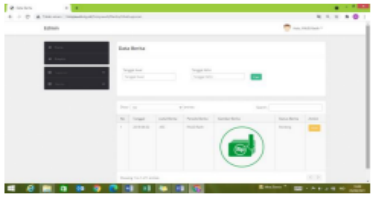


Fig. 24. News Page Interface Implementation

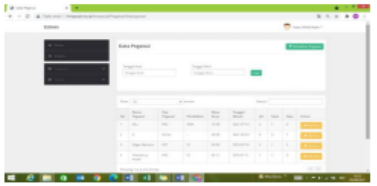


Fig. 25. Implementation of the Personeel Data Reporting Page Interface

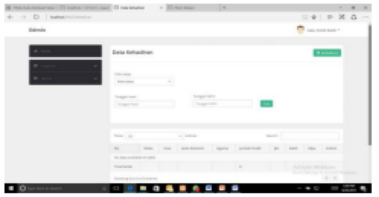


Fig. 26. Implementation of the Personeel Data Graphics Page Interface

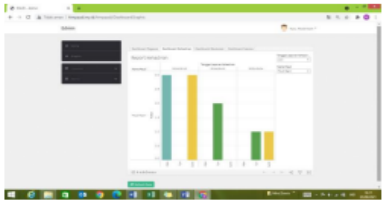


Fig. 27. Implementation of Student Attendance Data Page Interface

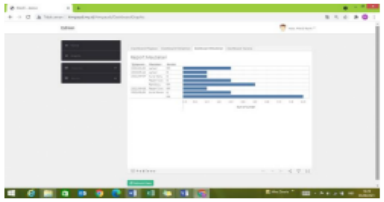


Fig. 27. Implementation of the Furniture Data Graphics Page Interface

The system test results are explained using a system test table that contains information about the Test Class, Input Data, Expected Results, Observation Results and Testing Conclusions.

Based on the results of the tests that have been carried out, it can be concluded that the system is functionally able to produce the expected output. From the results of the tests carried out, it can be concluded that the HIMPAUDI website in Bekasi Regency is in accordance with what is expected. Although there are still many shortcomings, functionally the system created is in accordance with the basic needs of HIMPAUDI.

The last stage of the development of the HIMPAUDI website is system management, namely by uploading web hosting with the domain http://himpaudi.my.id and submitting the website to HIMPAUDI of Bekasi Regency.

V. Conclusion

The conclusions that can be drawn from the research on Website Development of HIMPAUDI of Bekasi Regency as PAUD Reporting Support are as follows:

1. The HIMPAUDI of Bekasi Regency website as PAUD Reporting Support can be developed using the System Development Life Cycle development method.
2. District operators can manage information regarding profiles, agendas, news, secretariat, monitoring data, and reporting data on students, personeel, furniture, and facilities from the Institutional and District level through the HIMPAUDI website that was built.
3. Sub-district operators can manage data reporting on students, personeel, furniture, and facilities from the Institute and can report the data recap to the District level through the HIMPAUDI website that was built.
4. Institutional operators can manage the reporting of student data, personeel, furniture, and facilities from the institution to be reported to the District and Regency levels through the HIMPAUDI website that was built.
5. All PAUD institutions in Bekasi Regency and the public can seek information about profiles, agendas, news, secretariats through the HIMPAUDI website that was built.References

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He has been working as a lecturer at the Information Systems study program, Kalbis Institute of Technology and Business in Jakarta, Indonesia since 2012. The 3 international publications of Scopus indexed research are: (1) Saving and Loan Information System of Cempaka Cooperative Web Based, 2018 7th International Conference on Reliability, Infocom Technologies and Optimization: Trends and Future Directions, ICRITO 2018, 2018, pp. 784–791, 8748603. (2) Website Based Registration and Payment Information Systems at Primadia Clinic Laboratory, ACM International Conference Proceeding Series, 2017, pp. 209–215, dan (3) Web based Biblical library information system Lembaga Alkitab Indonesia – Jakarta, 2016 13th International Joint Conference on Computer Science and Software Engineering, JCSSE 2016, 2016, 7748900. The three publications can be viewed at https://www.scopus.com/authid/detail.uri?authorId=57192590518

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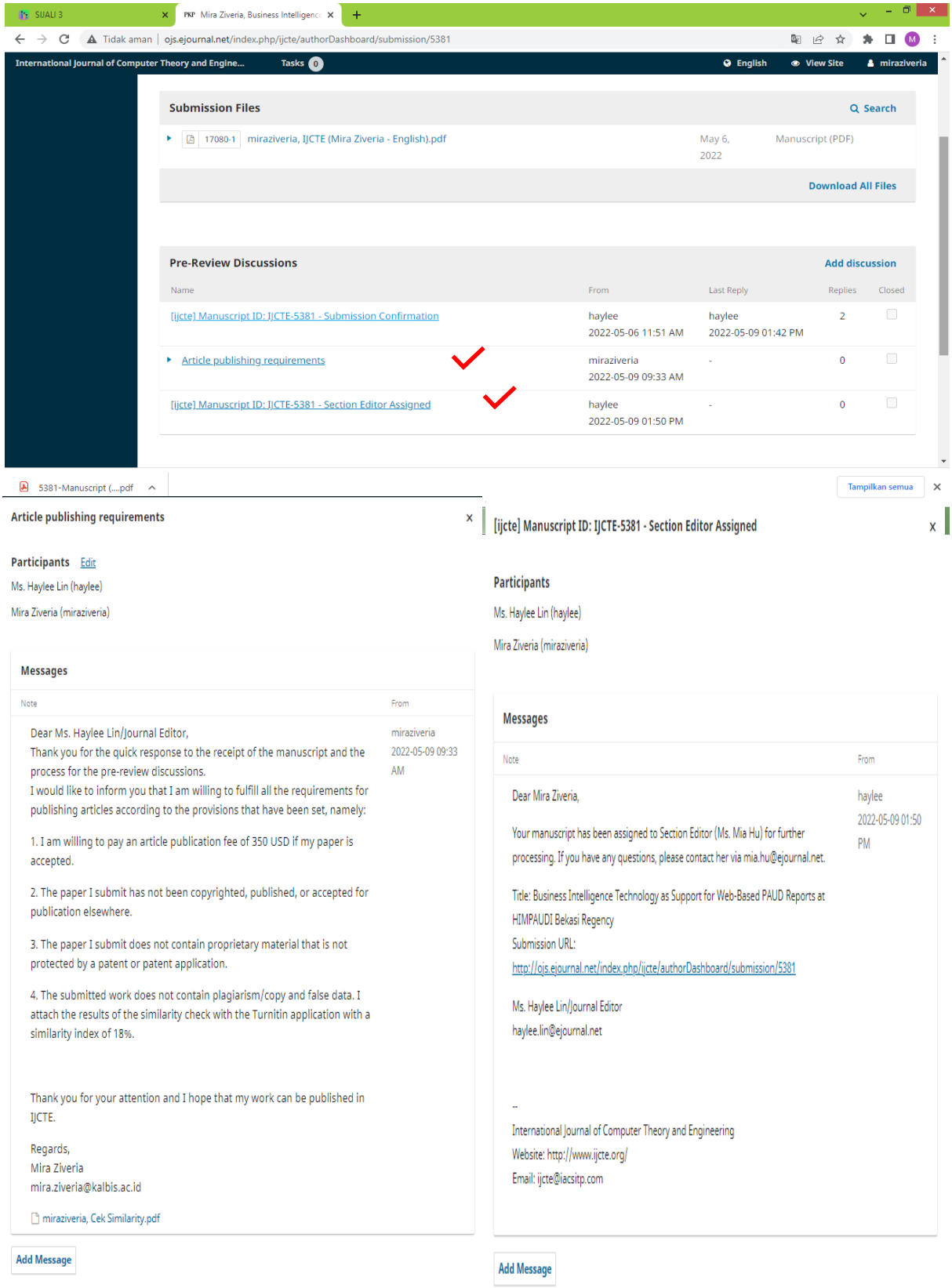
(9 Mei 2022)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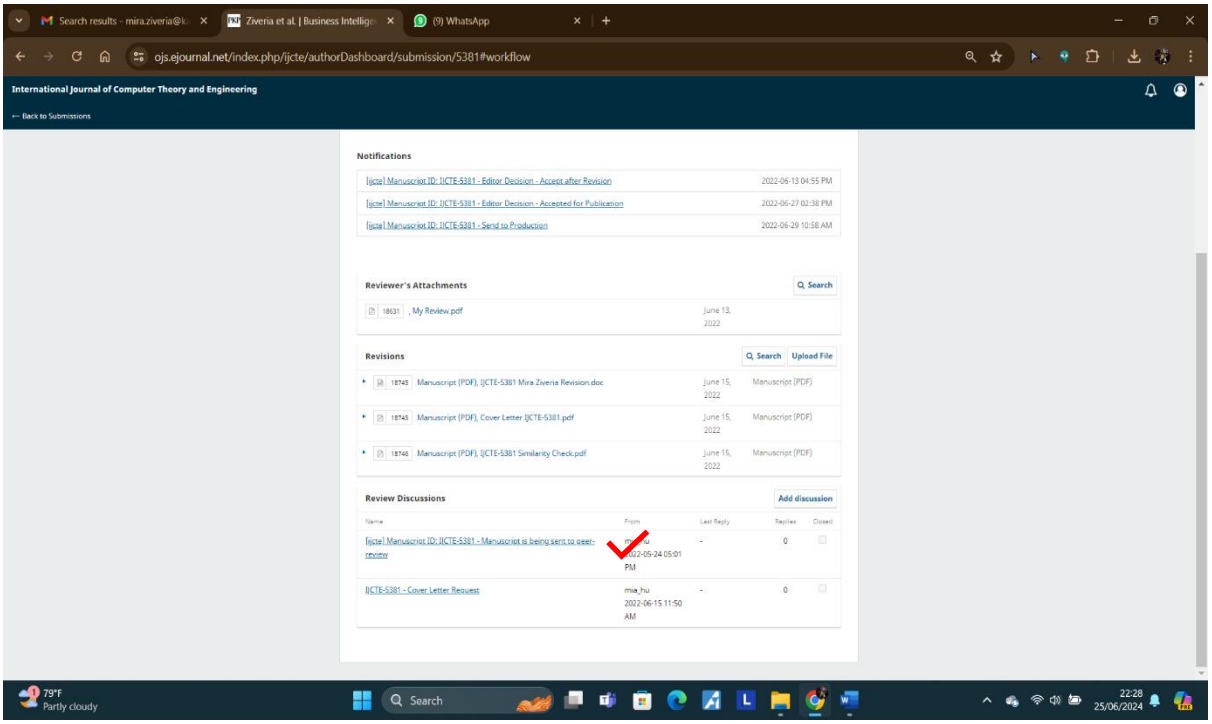

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Participants

Ms. Mia Hu (mia_hu)

Mira Ziveria (miraziveria)

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Dear Mira Ziveria, Your submission had been sent to peer-review, you may log into the submission system to track the progress. **Manuscript ID:** IJCTE-5381 **Title:** Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency **Submission URL:** http://ojs.ejournal.net/index.php/ijcte/authorDashboard/submission/5381 Generally, it will take appropriately 6 weeks to conduct the peer-review process. Please do not contact the journal editor to consult the process within this period, because it may increase the workload of the editor. However, if you do not receive the decision after 6 weeks, please add a discussion on this system, we will reply as soon as possible. **Note:** You may view "A review is overdue" on the system, this means the response due date or review due date for reviewers had been passed, this is a reminder for reviewers, not for authors. We will push the reviewers to accelerate the review, please do not ask for clarification. Ms. Mia Hu/Section Editor mia.hu@ejournal.net -- International Journal of Computer Theory and Engineering Website: http://www.ijcte.org/ Email: ijcte@iacsitp.com	mia_hu 2022-05-24 05:01 PM

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4. Bukti Konfirmasi Hasil *Peer Review* dan Komentar Reviewer

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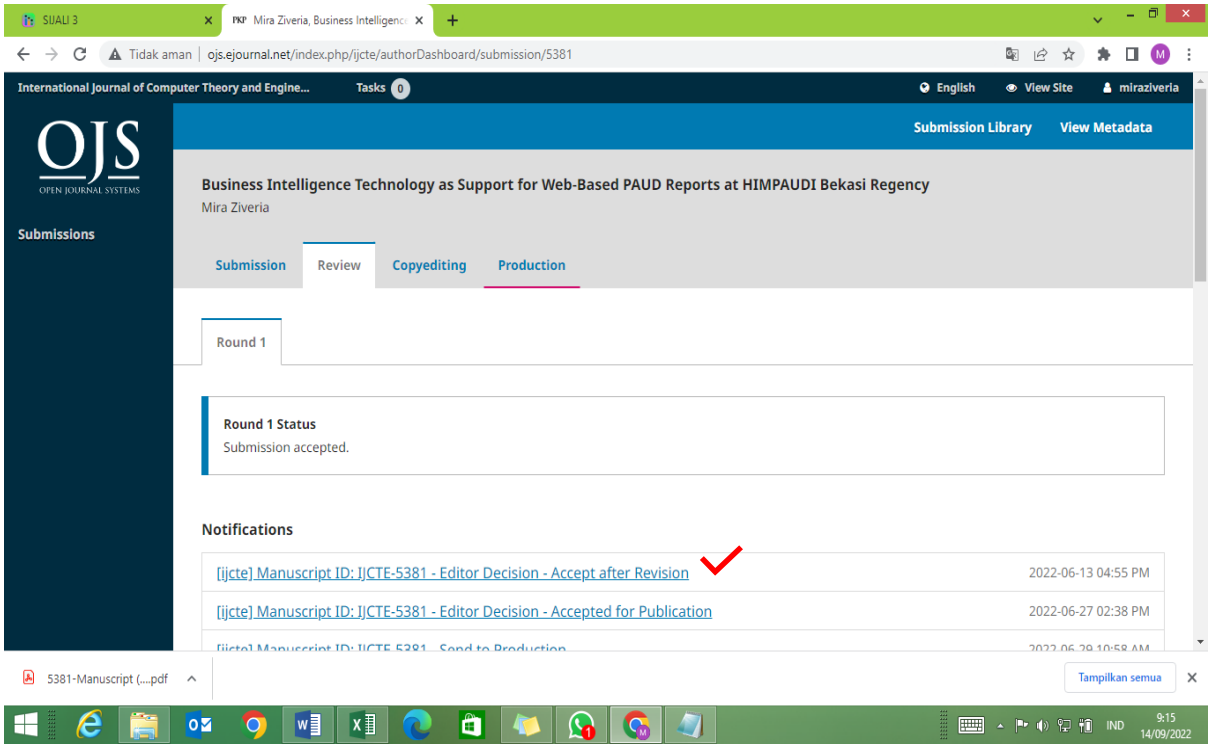

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Thank you for submitting your manuscript to International Journal of Computer Theory and Engineering.

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The manuscript had been checked by the journal editor and we request that you make minor revisions before it is officially accepted.

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Do not hesitate to contact us if you have any questions regarding the revision of your manuscript.

Ms. Mia Hu/Section Editor
mia.hu@ejournal.net

Reviewer A:

Comments to Authors

This paper is good and able to present all the work done using Business Intelligence Technology as Support for Web Based PAUD Reports at HIMPAUDI Bekasi Regency. It is suggested to add future work and limitation at the end of the paper to make it more valuable.

Reviewer B:

Comments to Authors

Since the article is titled "Business Intelligence Technology as Support for Web Based PAUD Reports at HIMPAUDI Bekasi Regency", much focus has to be given on the "Business Intelligence" theories, framework, and past researches. Your manuscript lacks the synthesis between Business Intelligence and organization's effectiveness; as you are developing a system to increase operational and decision making efficiencies of HIMPAUDI and PAUD. More comments and suggestions can be found in the review file, please download and check.

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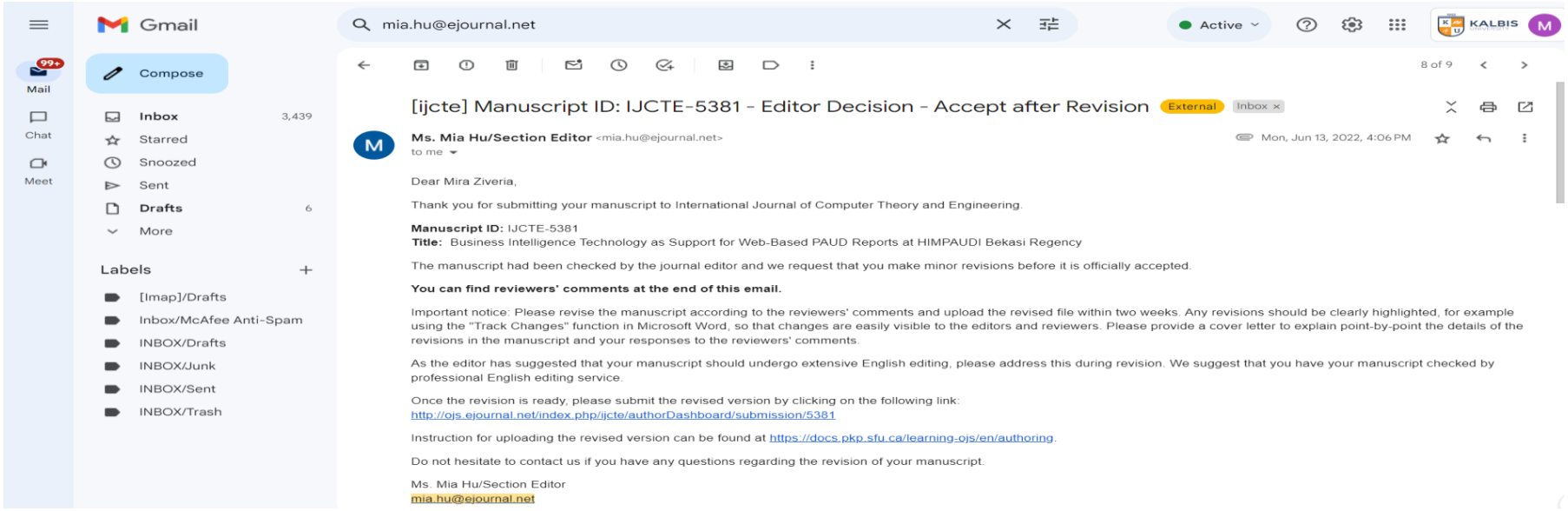
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The manuscript had been checked by the journal editor and we request that you make minor revisions before it is officially accepted.
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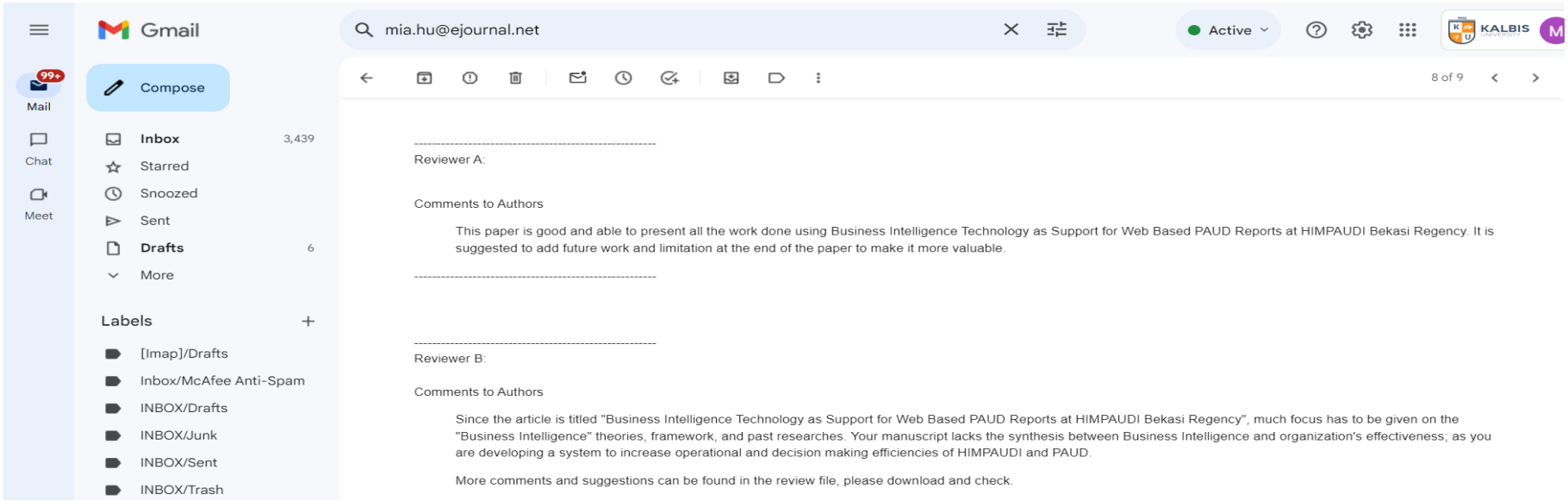
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Reviewer A:
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More comments and suggestions can be found in the review file, please download and check.

My Review

General overview

This article could have been written better:

a. LR on "*Early Childhood Education Programs*" is irrelevant to the research context.

b. Should include more LR on business intelligence, decision support system, data visualization etc. as the research is aim to "build a system by utilizing Business Intelligence technology"

c. The paragraph *"The problem in the research is how to build an application that applies Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency so that it can make it easier for every PAUD to send reports to HIMPAUDI, HIMPAUDI is easy to monitor, recapitulate, and reports uploaded in excel files can be recapitulated automatically. automatically by the system into a graphical form that can be viewed based on the desired parameters?"* I suggest *that the* researcher indicates the current issues first for example: significant time consumption to produce report, lack of dedicated personnel to produce reports, no centralized location for data/report storing etc. prompt the need of such web-based system to be developed....." In addition, the researcher should not write the sentence in a question orientation.

d. Sentence *"Based on the above background, the formulation of the problem in this research is how to build a system by utilizing Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency?"* I suggest the researcher to reword this sentence; it should not be in the form of question.

e. Sentence *"The specific purpose of this research is to build a web-based application by applying Business Intelligence technology to support PAUD reports at HIMPAUDI of Bekasi Regency with the SDLC development method which will later be submitted and implemented and managed by HIMPAUDI of Bekasi Regency so that the process of monitoring report recapitulation can be processed by the system with good processing quality, reducing error rates, saving time and costs, and helping the performance of HIMPAUDI of Bekasi Regency"* in the introduction section is repeated *in the Purpose of Research section; "The purpose of this research is to produce a web-based system for HIMPAUDI of Bekasi Regency which is managed by HIMPAUDI of Bekasi Regency administrators to be used by PAUD to provide reports to HIMPAUDI, can be monitored by HIMPAUDI of Bekasi Regency and can be recapitulated automatically by the system into a graphic form that can be viewed based on parameters by applying Business Intelligence technology.."* I suggest the researcher to redo the sentences.

f. The LR components can be restructured to:

a. Concepts of Information Systems (Web-based IS can be incorporated here as well)
b. Business Intelligence (System Source, ETL, Datawarehouse, Dashboard and Reporting)
c. SDLC

g. I suggest the researcher to include a high-level solution architecture for the system and further expand the research based on each subcomponent of the BI architecture

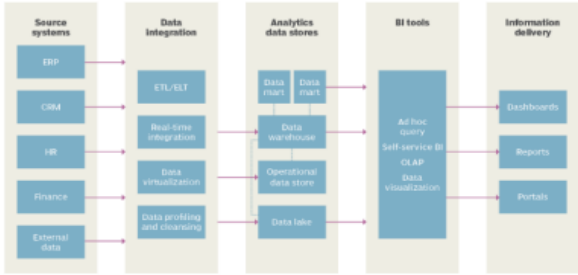
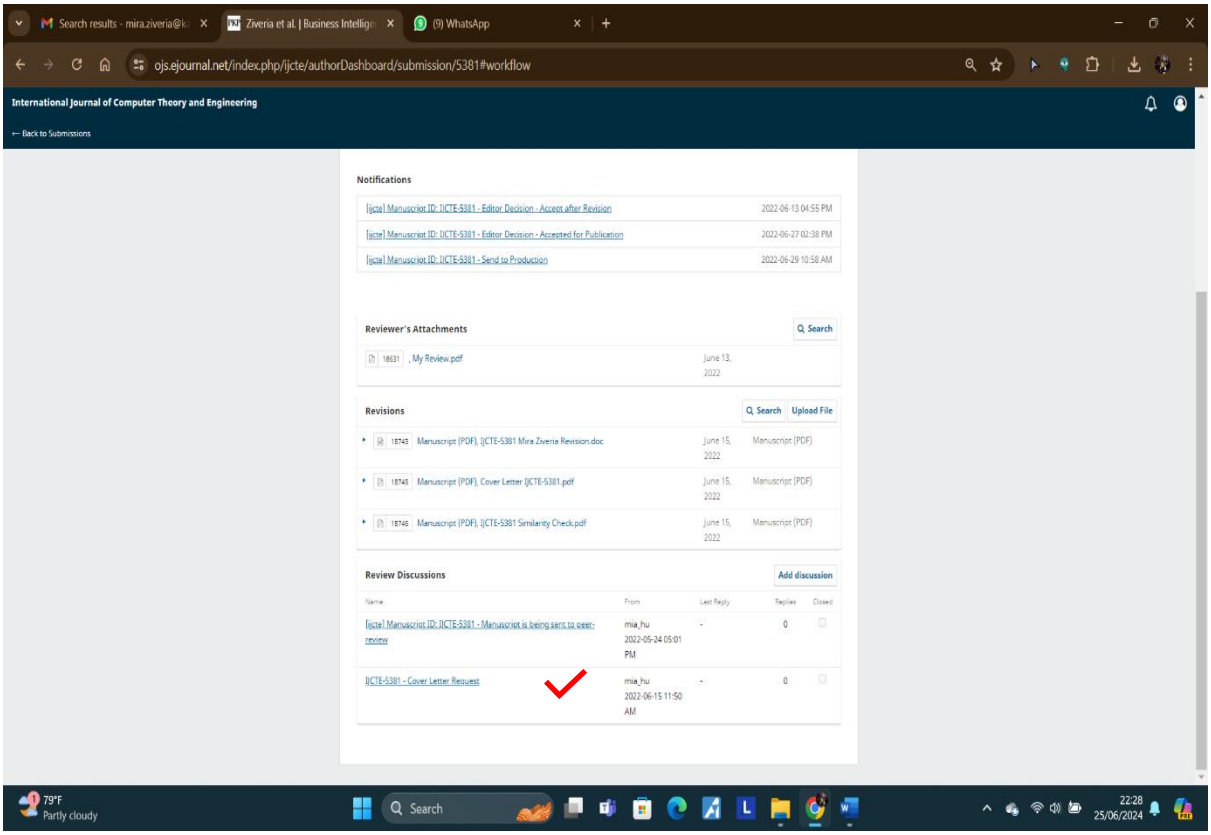


Figure 1 Business Intelligence Architecture (Source: www.techtarget.com)

5. Bukti Permintaan *Cover Letter, Similarty Check* dan Revisi Jurnal (15 Juni 2022)



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Mira Ziveria (miraziveria)

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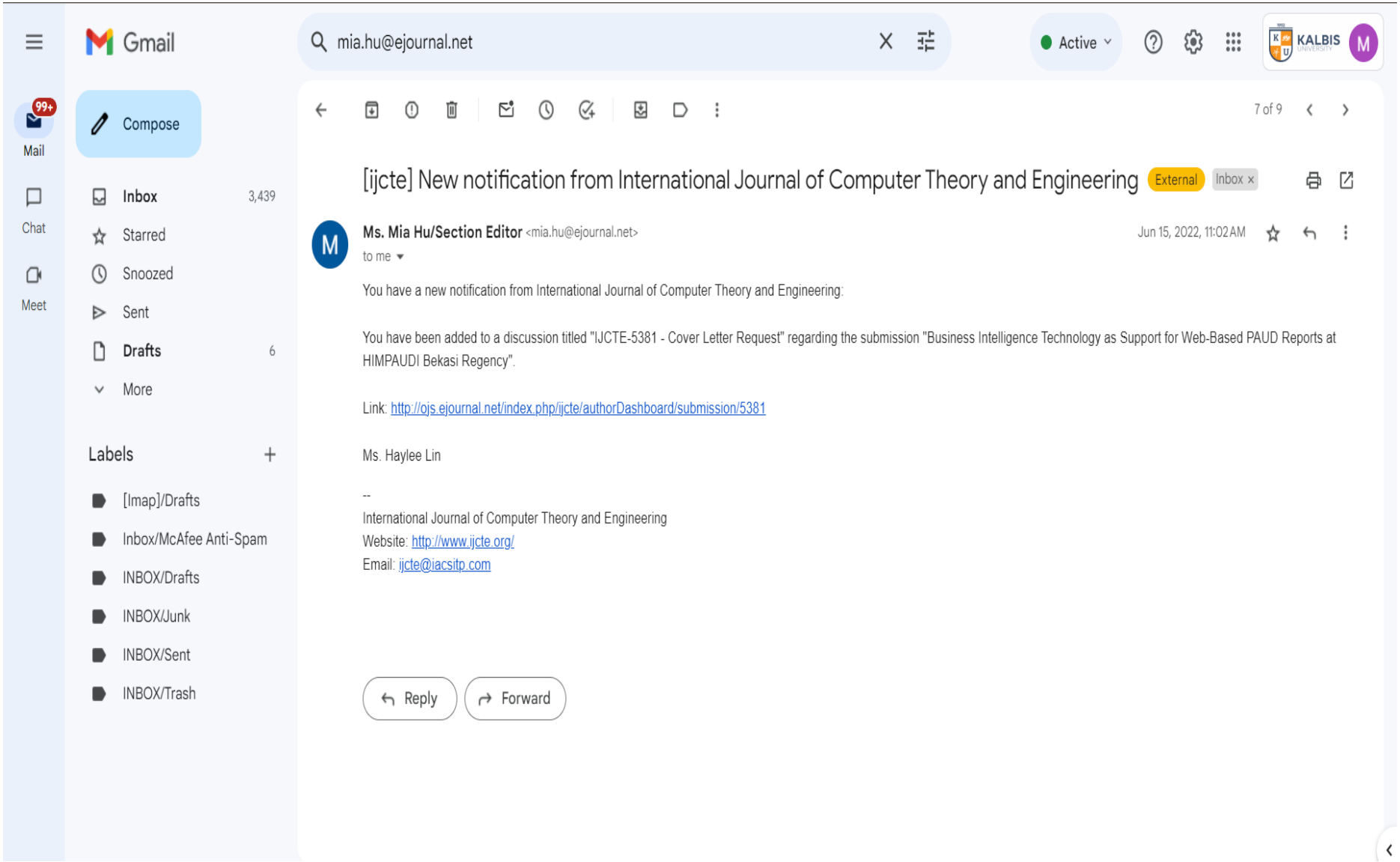
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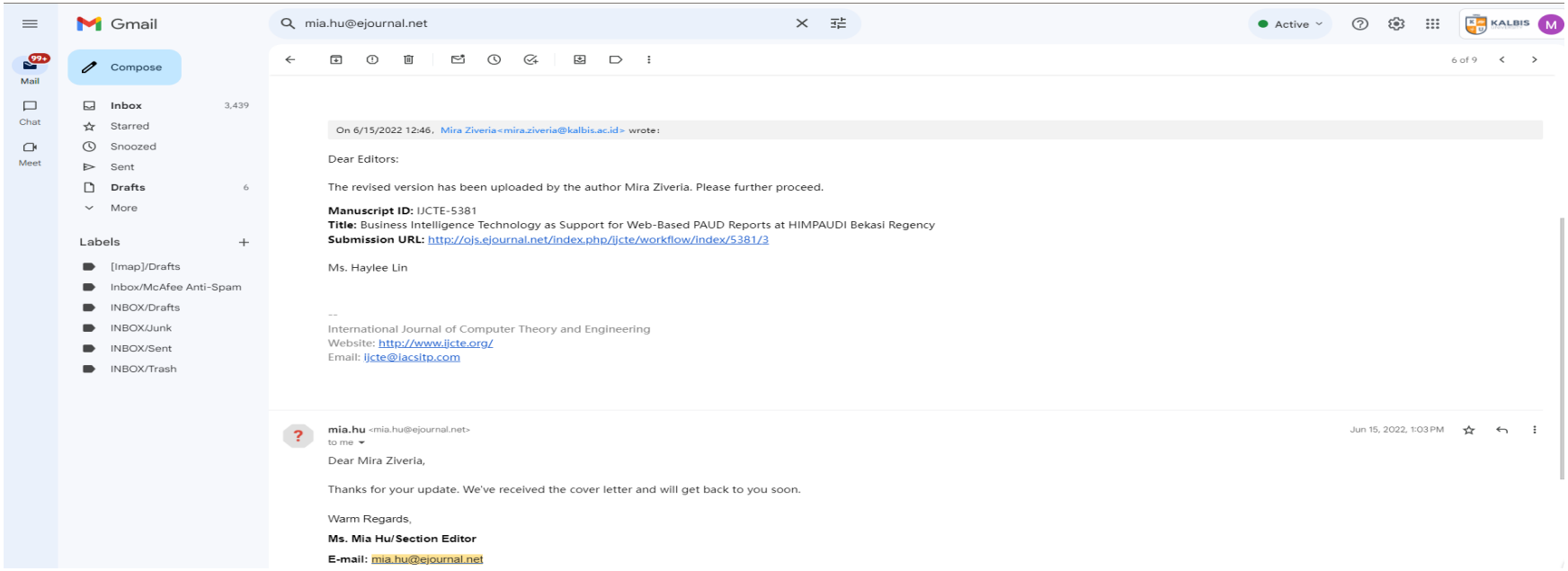
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A Cover Letter To Explain Point-By-Point The Details Of The Revisions In The Manuscript And My Responses To The Reviewers' Comments

a. I have removed the LR on Early Childhood Education Programs on page 2 of the Background section because it is not relevant to the research context.

b. I have added LR on business intelligence, decision support systems, data visualization, etc on pages 3 and 4 because the research aims to build a system by utilizing Business Intelligence technology.

c. I have added the current issues first in the background section of page 1, namely the sentence "Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports" and delete sentences in question orientation.

d. I have rewritten the sentence in the form of a question contained in the problem formulation on page 2 mejadi "The formulation of the problem in this research is to use business intelligence technology to support web-based PAUD reports in HIMPAUDI, Bekasi Regency."

e. I have deleted the repeated sentences on page 2 "The specific purpose of this research is to build a web-based application by applying Business Intelligence technology to support PAUD reports in HIMPAUDI Bekasi Regency with the SDLC development method which will later be proposed and implemented and managed by HIMPAUDI Regency Bekasi so that the monitoring report recapitulation process can be processed by a system with good processing quality, reducing error rates, saving time and costs, and helping the performance of HIMPAUDI Bekasi Regency " because it is the same as the sentence in the Purpose of Research.

f. I have restructured LR into 3 components which are:
- Information System Concepts (web-based IS can also be combined here)
- Business Intelligence (Source System, ETL, Datawarehouse, Dashboard and Reporting)
- SDLC

These components can be seen in the LR section on pages 2 to 5.

g. I have included a high-level solution architecture for the system and extended further research based on each BI architecture subcomponent in the research methodology section on page 6 which is Fig.3 Solution Business Intelligence Architecture.

h. I have changed a number of figures, tables, and references numbering due to the changes made in points a to g above.

Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

by Mira Ziveria

Submission date: 15-Jun-2022 09:24AM (UTC+0700)
Submission ID: 1857043551
File name: upport_for_Web-Based_PAUD_Reports_at_HIMPAUDI_Bekasi_Regency.pdf (1.39M)
Word count: 9328
Character count: 51609

Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

Mira Ziveria, Lufty Abdillah, and Salman

***Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini* (Association of Early Childhood Educators and Personnel of Education or HIMPAUDI) of Bekasi Regency is a group of 1680 entities of *Pendidikan Anak Usia Dini* (Early Childhood Education Programs or PAUD) spread across 23 sub-districts, 187 villages and 176 villages. HIMPAUDI Bekasi Regency strives to realize the application of computer technology to evaluate routine reports from PAUD educational institutions every month. At this time there are still many obstacles in processing reports into a form that is easy to understand. This study aims to build a computer-based system in reporting activities at HIMPAUDI Bekasi Regency which is useful for making it easier for each PAUD to send reports to the Regency HIMPAUDI, making it easier for District HIMPAUDI to monitor and recap all reports, and facilitate the analysis of HIMPAUDI reports for Bekasi Regency. The report system built is a web-based system that uses Business Intelligence technology to analyze reports so that reports uploaded in the form of excel files can be automatically recapitulated by the system into graphs that can be viewed based on parameters such as year, age, study group, and so on. The website development method uses the System Development Life Cycle (SDLC) which starts with data collection, system analysis, system design, implementation, testing and system maintenance. The result of the research is a web-based Business Intelligence application to support PAUD reports in Himpaudi Bekasi Regency which is submitted and then managed by Himpaudi of Bekasi Regency.**

***Index Terms*—Business Intelligence, reports, SDLC, web.**

I. Introduction

In this section, the researcher explains the background, problem formulation, objectives, and benefits of this research.

A. Background

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. The HIMPAUDI Secretariat of Bekasi Regency is located at Jalan MT.Haryono No.26, Taman Rahayu Village, Setu District, Bekasi Regency, West Java Province. The number of PAUD in Bekasi Regency is 1,680 PAUD consisting of 976 TK/RA (kindergarten/raudhatul athfal), 574 KB (playgroup), 14 TPA (child care), and 116 SPS (similar PAUD unit) [1].

HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports.

HIMPAUDI of Bekasi Regency strives to realize the application of computer technology to recapitulate routine reports from PAUD educational institutions every month. It takes a system that can accommodate these reports in a practical and efficient manner in obtaining the results of report analysis and reports can be presented in a neat and attractive manner. Reports that are routinely sent every month include student, teacher, and personeel data. Student data sent includes identity, class, last month's student condition, current month's student condition, attendance, PAUD facilities and infrastructure, and others. Teacher and personeel data includes identities such as last education, status, decree, years of service, attendance, and others.

Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports.

The problem in the research is how to build an application that applies Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency so that it can make it easier for every PAUD to send reports to HIMPAUDI, HIMPAUDI is easy to monitor, recapitulate, and reports uploaded in excel files can be recapitulated automatically. automatically by the system into a graphical form that can be viewed based on the desired parameters.

Researchers under the auspices of the Institut Teknologi dan Bisnis Kalbis have collaborated with HIMPAUDI of Bekasi Regency since 2016 for research activities and community service. Based on observations and analysis results, researchers can identify the needs of partners, one of which is a problem in reporting data from PAUD throughout Bekasi Regency, which number in the thousands to HIMPAUDI Regency every month. In 2019 researchers conducted research on PAUD data reporting at HIMPAUDI of Bekasi Regency by building a website whose one function was to support data reporting, but the resulting system did not help much because the report was not analyzed by the system, making it difficult to understand.

Based on this, in this research proposal, the researcher tries to use Business Intelligence technology so that PAUD reports uploaded in excel files can be recapitulated automatically by the system into graphic form that can be viewed based on the desired parameters such as year, age, study group, and so on.

B. Formulation of the Problem

The formulation of the problem in this research is to use business intelligence technology to support web-based PAUD reports in HIMPAUDI, Bekasi Regency.

C. Limitation of the Problem

Limitations of the problem in this research are:

1. The research was conducted in HIMPAUDI of Bekasi Regency, therefore the system design was adapted to the current condition of Himpaudi.
2. Development of a website as a means of conveying HIMPAUDI information including profiles, agendas, news, data, and the Himpaudi secretariat.
3. Development of a website as a means for reporting PAUD to HIMPAUDI covering data on students, educators and education staff, as well as facilities and infrastructure.

D. Purposes of Research

The purpose of this research is to produce a web-based system for HIMPAUDI of Bekasi Regency which is managed by HIMPAUDI of Bekasi Regency administrators to be used by PAUD to provide reports to HIMPAUDI, can be monitored by HIMPAUDI of Bekasi Regency and can be recapitulated automatically by the system into a graphic form that can be viewed based on parameters by applying Business Intelligence technology with the System Development Life Cycle (SDLC) method and using the PHP programming language and MySQL database as well as XAMPP and Tableau software.

E. Benefits of Research

The development of the Bekasi Regency HIMPAUDI website can provide the following benefits:

1. For HIMPAUDI of Bekasi Regency, among others: (a) HIMPAUDI management can publish information related to their agencies through the website, (b) HIMPAUDI management can monitor and obtain PAUD reports, and can automatically recapitulate through the system into a graphic form that can be viewed based on several parameters, (c) PAUD administrators at the sub-district level can easily report to district-level administrators through the system.
2. For the community, among others: (a) Get information quickly and easily about HIMPAUDI of Bekasi Regency, (b) Educate the public to be able to find information about HIMPAUDI through the website.

II. Literature Review

This section, the researcher explains the theory, perspective, literature review and previous research related to the topic of this research.

A. HIMPAUDI

HIMPAUDI is an independent organization that brings together elements of early childhood educators and education personnel. Association of Early Childhood Educators and Personnel of Education or abbreviated HIMPAUDI (*Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini*) is a professional organization that houses non-formal PAUD educators and education personnel. HIMPAUDI has the duty and role to facilitate PAUD educators in developing all their potential, especially in terms of developing their competence as PAUD educators so that they are able to provide educational services for early childhood optimally in accordance with what is stated in HIMPAUDI's vision, namely realizing educators and education personnel for young children. strong, professional, and noble character [2].

B. Basic Concepts of Information Systems

The system is a network of interconnected procedures and procedures that gather together to carry out an activity or complete a certain task [3].

The system is the elements that are interrelated and work together to process the input or input addressed to the system and process the input to produce the desired output or output. The elements contained in the system include: [4]

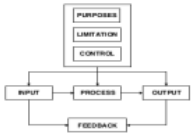


Fig. 1. Element of System

Based on the theory that has been put forward, researchers can conclude that the system is an element that is interconnected to achieve a certain goal. From Figure 3 above, it can be explained that the objectives, limitations and control of the system will affect the process input and output. Inputs that enter the system will be processed and processed to produce output. The output will be analyzed and will become feedback for the recipient and from this feedback will emerge all kinds of considerations for further input. Furthermore, this cycle will continue and develop according to the existing problems.

Data that is processed through a model becomes information, the recipient of the information then receives the information, makes a decision and takes action, resulting in another action that makes some data back. The data is inputted, reprocessed through a model and so on to form a cycle. This cycle by John Burch is called the information cycle [3].

Information is a collection of data or facts that are organized in a certain way so that they have meaning for the recipient. The quality of information depends on three things, namely the information must be accurate, timely, and relevant. An information system is a system within an organization that brings together the daily transaction processing needs that support managerial organizational operations functions with strategic activities of an organization in order to be able to provide certain outside parties with the necessary reports. Information system components include input, model, output, technology, database, and control [5].

C. Web-Based Information System

A web-based information system is an information system that uses web or internet technology to support and facilitate human work to become more efficient. Because a web-based information system uses the help of the internet or web-based applications, it means that there are things that must be met to create this web-based information system such as HTML, CSS, Javascript web programming languages, the use of web servers, for example, the Apache web server and also a data storage warehouse or database. which you can create using Oracle or MySQL. The requirements for the formation of a website are: [6]

1. Availability of Web Server, either static or dynamic web. If you want to be online on the internet, the first requirement must be to have a server, both hardware and software. Hardware is a set of computers that are always connected online to the internet. For software, apart from the operating system, software for the web server itself must also be provided. For now, the favorite web server is Apache.
2. Availability of Server-Based Web Programming Software. If you want to create a web, it means that a web programming language other than HTML must be available, both client side and server side. For the client side, it has a drawback that the program instructions can be seen by internet users. While the server side is more secure because the program instructions are not visible to the user, what is visible is like ordinary HTML. An example of a favorite web programming language is PHP.
3. Availability of Databases. Database is software used to store and manage data. If you have a little data, maybe you can still use ordinary files as storage media. But if the data is already very much, without a database it will be very complicated. Databases can store millions of data and can be accessed very quickly. Examples of databases that can be used to create a web are Oracle, MySQL, and many others. The database that will be used by the author is MySQL.

D. Business Intelligence (BI)

BI is a collection of techniques and tools for transforming raw data into useful and meaningful information for business analysis purposes. BI technology can handle huge amounts of unstructured data to help identify, develop, and otherwise create new business strategic opportunities. The purpose of BI is to facilitate the interpretation of this large amount of data. Identifying new opportunities and implementing an effective strategy based on insights can provide a business with a competitive market advantage and long-term stability.

BI is the process of using the power of people and technology to collect and analyze data for use by organizations in strategic and day-to-day decision-making processes. Thus, the process involved involves collecting data into a data warehouse or other data warehouses. Next, the company will use special tools to analyze the data. The essence of BI is the process of taking raw data that most people cannot understand, and then processing it by converting raw data into understandable information so that data users can carry out their work properly.

The main goal of BI is to drive better and quality business decisions. In this way, the company can increase its revenue, improve business operational efficiency, and gain a competitive advantage in the midst of market competition. And to achieve this goal, BI uses a series of analyzes that are combined according to the purpose and needs of their use, data management tools and data reporting, along with various methodologies for managing and analyzing data.

In a BI architecture, we can not only find BI software. BI data is generally stored in data warehouses created for the entire company, as well as in smaller spaces that contain pieces of business information, for example for each division or business unit. However, all of these parts are related to the data warehouse of the company as a whole.

BI data can be in the form of historical information or real-time data, all of which is gathered from the source system as it is generated. Therefore, tools in BI can support strategic and tactical (daily) decision-making processes. The raw data collected from various source systems need to be integrated first, as well as combined and cleaned using data integration tools and data quality management tools. Its purpose is to ensure that its users obtain accurate and consistent information in the business analysis process. [7]

The BI process involves the following steps:

1. Integration of data from source systems into a data warehouse or other data warehouse.
2. Preparation of data into analytical data models for analysis requirements.
3. Application of analytical queries to data by BI analysts and professional business analysts.

4. Creating data visualizations, dashboards, reports, and so on using query results.
5. Use of information for corporate strategic planning and decision making.

E. Decision Support Systems

Decision Support System (DSS) is defined as a computer-based system consisting of interacting components, namely language systems, knowledge systems, and problem processing systems. DSS is not a decision-making tool, but a system that helps decision makers by equipping them with information from data that has been processed relevantly and needed to make decisions about a problem more quickly and accurately. DSS is intended to help decision makers to solve semi- and or unstructured problems with a focus on presenting information that can later be used as the best alternative decision-making material. [8]

The Decision Support System consists of 3 main components, namely:

1. Database, is a component of a decision support system providing data for the system. The data is stored in a database organized by a system called the Database Management ystem/DBMS.
2. Model
3. Dialog (User System Interface)

F. Dashboard System

Dashboard is an application that serves to display performance-related information for company managers. The dashboard concept has been around for years and has been adopted by many companies around the world. Dashboard is a visual representation containing important information needed to achieve goals and can be arranged on one screen so that it will be easier for users to monitor it. Meanwhile, the information dashboard is a visual display containing important information needed to achieve goals by organizing information on one screen so that organizational performance can be monitored [9].

There are three types of dashboards, namely:

1. Strategic Dashboard

Strategic dashboards are useful to support strategic level management in obtaining information to make business decisions, predict opportunities, and provide direction in achieving strategic goals.

2. Tactical Dashboard

Tactical dashboards focus on the analysis process to determine the cause of a particular condition. This dashboard serves to measure short-term productivity and effectiveness whose results are often used by individual contributors.

3. Operational Dashboard

Operational dashboards are useful to support monitoring of specific business process activities in their daily life. This dashboard measures the short-term effectiveness of specific business functions at the team or business unit level.

G.Tableau

Tableau is a tool that can facilitate the creation of interactive visual analysis in the form of a dashboard. Another definition of Tableau is that Tableau is software that supports collaborative data visualization for someone who works in analyzing business information. From the two definitions above, it can be concluded that Tableau is software that can process data into an attractive visual. That way, the data set will be easier to understand. Tableau has various advantages that can be taken into account when visualizing data in the form of graphs or dashboards. Some of Tableau's advantages include interactive visual options, user friendly, processing multiple data sources, mobile friendly dashboard, and integration with scripting languages. Tableau combines SQL in the database with a descriptive language to create graphs and creates a database visualization language called VizQL. The version used by the researcher is Tableu Public which is free and can be used by anyone. [10]

H.Reports

One of the important points in this research is how to process and integrate a report. The following is the definition of a report according to several experts: A report is a form of presenting facts about a situation or activity. The facts presented relate to the responsibilities assigned to the reporter [3].

According to Rakesh TK, "Reporting Solution is to deliver and implement a consistent, personalized information delivery system that includes performance data (key performance indicators) which are relevant, accurate and transparent for use by regional management and executives to enable decision making each month. [5]

Can be interpreted as, a report is a collection of data in which it is formed based on relevant, accurate and transparent KPIs (key performance indicators) to be used by management or executives in making decisions on a monthly basis. Report types can be grouped based on a certain time, namely Regular/Periodic Reports, Special/Exception Reports, Unscheduled Reports, Special Analysis Reports, Process Inquiry Reports [11].

I. System Development Life Cycle (SDLC)

SDLC is a pattern taken to develop a software system, which consists of the following stages: system planning (planning), analysis (analysis), design (design), implementation (implementation), testing (testing) and management (maintenance). In software engineering, the concept of SDLC underlies many types of software development methodologies. SDLC stages are as follows [12]:

1. System planning system (planning), more emphasis on aspects of the feasibility study of system development (feasibility study).
2. System Analysis (analysis). The project objectives refine into defined functions and operations of the intended application. Analyze the end user required information.
3. System Design (design). Describes the desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudo and other documentation.
4. System Implementation (implementation). Implement the design from the previous stages and conduct trials.
5. System testing (testing), namely testing the system that has been made.
6. System Management (maintenance). It is carried out by the appointed admin to keep the system able to operate properly through the system's ability to adapt itself according to needs.

J. Data Flow Diagram (DFD)

DFD is a diagram that uses notation to describe the flow of data in a system, whose use is very helpful for understanding the system logically, structured and clearly. DFD can also be used as a in describing or explaining the work process of a system. DFD is a system design tool that is oriented to the flow of data with a decomposition concept that can be used for describing analysis and system design that is easily communicated by system professionals to users and program makers. There are 3 levels of DFD, namely Context Diagram, Zero Diagram (Level 1 Diagram), and Detailed Diagram [4].

TABLE I: Data Flow Diagram Notation

SYMBOL	REMARKS
	*External Entity* is a unit (entity) in the system environment which can be in the form of people, organizations or other systems in the external environment that will provide input or output from the system.
	*Data Flow* shows the flow of data which can be input to the system or the results of system processes.
	*Process* are activities or work carried out by people, machines or computers from the results of a data flow that enters the process to produce data flows that will come out of the process.
	*Data Store* is from data that can be in the form of a database on a computer system, an archive, manual notes, an agenda, or a book

K.Entity Relationship Diagram (ERD)

In the ERD model, the universe of data that exists in the real world is translated by utilizing a number of conceptual tools into a data diagram, which is generally referred to as an Entity-Relationship Diagram (E-R Diagram). The Entity-Relationship model is formed from two components, namely entities (entities) and relationships (relation). These two components are further described through a number of attributes. ERD was first described by Peter Chen which was created as part of the CASE software. The notations used in ERD are entities, relationships, attributes and lines [12].

L. User Acceptance Test (UAT)

UAT is a testing process carried out by the user with the output of a test result document that can be used as evidence that the software has been accepted and has met the requested requirements. The UAT is not much different from the questionnaire in the early stages of making the application.

UAT is a verification process that the solution created in the system is suitable for the user. This process is different from testing the system (making sure the software doesn't crash and conforms to the user's request documents), but rather making sure that the solution in the system will work for the user, testing that the user accepts the solution in the system. UAT is generally performed by the client or end user, usually focusing not on the identification of simple problems such as spelling errors, nor on howstopper defects, such as software crashes. Testers and developers identify and fix these problems during the early stages of functionality testing, during integration testing and at the system testing stage [6].

M. Previous Researchs

In this sub-chapter, previous research that is relevant to the research conducted by the researcher will be discussed. The results of the researcher's observations regarding "Development of the Bekasi Regency Himpaudi Website as Support for PAUD Reporting" have never been carried out, but there are several similar topics that have been carried out, including the following:

1. "Aplikasi *Intelligence Website untuk Penunjang Laporan PAUD pada HIMPAUDI Kota Tangerang*" by Dina Fitria Murad, Nia Kusniawati, and Asyanto from STMIK Raharja that published in the CCIT Journal Vol.7 No.1 September 2013 [13].
2. "Web Information Monitoring for Competitive Intelligence" by Bing Tan, Schubert Foo, and Siu Cheung Hui from School of Computer Engineering, Nanyang Technologycal University, Nanyang Avenue, Singapore that published in the International Journal Cybernetics and System Vol.33, November 2010 [14].
3. "Perancangan Sistem Penyajian Laporan Realisasi Anggaran pada Badan Pusat Statistik Kota Tangerang" by Sudi Hartati from STMIK Raharja in 2009 [15].

III. Research Metodology

The method of collecting data in this study was to conduct interviews with several PAUD and HIMPAUDI administrators in Bekasi Regency and make direct observations to see the implementation of reporting and also how HIMPAUDI disseminates information to PAUD and the community regarding the profile and activities carried out by HIMPAUDI or PAUD. Observations were made on August 1 and 17 2018 and took place at PAUD Pelita Rahayu, Setu District, which is the Secretariat of HIMPAUDI, Bekasi Regency and SPS Bhakti Pertiwi, Tambun Selatan District, Bekasi Regency.

Based on interviews and observations made by researchers, researchers obtained information about the general description of HIMPAUDI of Bekasi Regency. The general description of HIMPAUDI contains a profile that includes the vision and mission, activities, management, organizational structure, as well as examples of reports that must be made and sent from PAUD to HIMPAUDI Regency which is carried out every month.

The website system development method in this study uses the System Development Life Cycle (SDLC) method starting from planning, analysis, design, implementation, testing and maintenance.

Fig. 2. Stages of System Development Life Cycle

Details of activities for each SDLC stage carried out in the study can be seen in Table 2.

TABLE II: Stages of Research

Stages of Research	Activites
System Planning	• PAUD and HIMPAUDI • Scope of HIMPAUDI of Bekasi Regency • Vision, Mission and Goals HIMPAUDI of Bekasi Regency • Organizational Structure of HIMPAUDI of Bekasi Regency • Secretariat of HIMPAUDI of Bekasi Regency
System Analysis	• Data Reporting from PAUD Village /Ward to HIMPAUDI of Bekasi Regency • Recapitulation of PAUD reports to HIMPAUDI of Bekasi Regency • Information Dissemination from HIMPAUDI Bekasi Regency to the Village/Ward Level • Weaknesses of the Running System • Feasibility study • System Functional Requirements Analysis • Analysis of Non-Functional System Requirements
System Design	• Context Diagram • Data Flow Diagrams (DFD) Level 1 and 2 • Database Design (Entity Relationship Diagram and Physical Data Model, Table Structure) • Interface Design • Hardware and Software Design
System Implementation	• Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor • Implementation of Data Visualization with Tableau • Database Implementation with MySQL
System Testing	• Testing using free Web Hosting with black box testing
System Management	• Rent Web Hosting and Domain • Upload to Web Hosting • System Usage Guide • Submission of the website to HIMPAUDI Bekasi Regency

This research activity was conducted at Institut Teknologi dan Bisnis Kalbis, Jalan Pulomas Selatan Kav.22, East Jakarta. This research was conducted for one year, starting from October 2020 to September 2021.

Solution business intelligence architecture for the system can be seen in the Figure 3.

Fig. 3. Solution Business Intelligence Architecture

IV. Result and Discussion

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. An overview of the scope of HIMPAUDI in Bekasi Regency which oversees PAUDs in Village / Ward in Bekasi Regency can be seen in Figure 4.

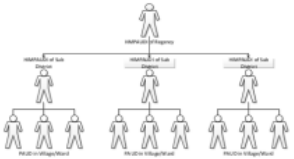


Fig. 4. Scope of HIMPAUDI of Bekasi Regency

The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. The types of reports that are routinely sent from each PAUD to the sub-district level and continued to the district level are reporting:

1. Report of Student Data
2. Report of Educator and Personeel of Education.

The process of reporting PAUD from Village/Ward to HIMPAUDI Center (HIMPAUDI of Bekasi Regency) can be seen in Figure 5.

Fig. 5. Report of PAUD to HIMPAUDI of Bekasi Regency

An example of a student data reporting form from PAUD at the village/ward level to the sub-district level can be seen in Figure 6 and an example of reporting data on educators and education personnel from PAUD at the village/ward level to the sub-district level and from the sub-district to the district level can be seen in Figure 7.

Fig. 6. Report of Student Data from PAUD in Village/Ward to HIMPAUDI in Sub-District

Fig. 7. Report of Educator and Personeel of Education in Sub-Dustrict to District Level

Dissemination of information such as news, agenda, and data from HIMPAUDI Bekasi Regency to the Village/Ward Level or to the wider community is carried out in several ways and the media. The method is carried out such as holding a meeting or meeting by inviting the chairperson, operators, educators and education staff to the District HIMPAUDI Secretariat. The media used are sending letters, brochures, banners, email, telephone, whatsapp messages, and others.

Fig. 8. Dissemination of Information HIMPAUDI of Bekasi Regency

In terms of disseminating information such as news, agendas, and data from HIMPAUDI of Bekasi Regency to the Village/Ward Level or to the wider community using media such as sending letters, brochures, banners, emails, telephones, whatsapp messages on the current system, the weaknesses are:

1. If using email, the HIMPAUDI operator at the Regency level must send it to all email addresses of all operators or leaders. This requires precision and a long time.
2. If you use a letter, it will take a long time to arrive at the Village/Ward level and also requires a mail delivery fee.
3. If using a banner, the range of information conveyed is limited only to people who see the banner. So with banners it is difficult to reach all PAUD in Bekasi Regency.
4. If you use a phone and whatsapp message, it will take a long time because you have to call all PAUD in Bekasi Regency.
5. Does not have an effective and efficient forum to convey information about profiles, agendas, news, and data from HIMPAUDI of Bekasi Regency to PAUD under it and the general public.

In terms of reporting data on students, educators, and education staff from PAUD at the Village/Ward level to the sub-district level and continued to the district level using an excel file that is printed and sent to the current system, the weaknesses are:

1. It takes a long time for the process of sending reports from PAUD at the Village/Ward level to arrive at HIMPAUDI District.
2. It takes a long time to process data recording at the sub-district level because it must accumulate all data from the village/ward level PAUD.
3. The accuracy of reporting data and data recapitulation at the sub-district level is not guaranteed because they have to manually recap reports from PAUD-PAUD at the Village/Ward level.
4. Does not have an effective and efficient forum for reporting data on students, educators, and education staff from PAUD at the Village/Ward level to HIMPAUDI, Bekasi Regency.

Based on observations made by researchers in the field, it can be seen that this research has never existed in the HIMPAUDI environment of Bekasi Regency. Based on the results of interviews conducted by researchers with the Head of HIMPAUDI of Bekasi Regency, Secretary Himpaudi Bekasi Regency, and several PAUD chairpersons and operators in Bekasi Regency, research to build the Bekasi Regency HIMPAUDI website using business intelligence technology to support PAUD reporting has never been carried out and is very feasible for realized because the system that the researcher will do is one solution to increase the speed and accuracy of delivering information from HIMPAUDI Regency to the Village/Ward level and also for reporting data from PAUD Village/Ward to HIMPAUDI Regency to be more effective and efficient.

Functional requirements are requirements that must be met so that a system can run as expected. The functional requirements that must exist on the Bekasi Regency Himpaudi website to be developed are described in Table 4.

TABLE III: System Functional Requirements

User	Functional Requirements
HIMPAUDI Regency	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as HIMPAUDI Regency operator • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of graphs, namely dashboards for personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from sub-district and sub-district early childhood in pdf format • Can manage news to be published to sub-district, sub-district/village early childhood • Can manage agendas that will be published to sub-district, ward/village early childhood education • Can manage user access rights for village/ward, sub-district, and district levels
HIMPAUDI Sub- Districct	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and information on the Bekasi Regency HIMPAUDI secretariat • Can log in and log out as a sub-district HIMPAUDI operator • Can receive and monitor recap reports from sub-district early childhood education in graphic form, namely dashboard of personeel attendance, student attendance, furniture, and facilities based on required parameters • Can receive and monitor the recap of reports from the PAUD of Village/Ward in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from the PAUD of Village/Ward in pdf format • Can provide news proposals to district preschools for publication • Can receive information published by district preschools, including profiles, agendas, news, and downloadable data
HIMPAUDI Ward/Village	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as a sub-district/village HIMPAUDI operator • Can send reports to sub-districts and districts in the form of student attendance data, personeel attendance, furniture and facilities data • Can provide news proposals to district preschools for publication
General Public	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency

Non-functional requirements include hardware requirements and software requirements. The hardware that will be used is utilizing the hardware already owned by HIMPAUDI operators and the community. HIMPAUDI operators include operators at the institutional, sub-district, and district levels. The number and specifications of the hardware owned already support the operation of the designed system. While using manual reporting using an excel file, the operator is already using a computer or laptop whose specifications vary.

The hardware that can be used in the system made are: (1) PC, (2) VGA monitor has a minimum resolution of 800 x 1200 pixels, (3) Keyboard and mouse to perform user activities, (4) Internet broadband, (5) All the hardware used is a standard device in a computer system as well as for internet connections.

The software used in this research process as follows: (1) Hardware in the form of a computer set with specifications Processor Intel® CORE™ i5-2450M, CPU @ 2.5 GHz, 4.0 GB RAM, (2) Software in the form of Microsoft Windows 8, Microsoft Office 2010, Notepad++ application as a text editor, MySQL as database software, XAMPP server as a web server, Microsoft Visio software for creating flowcharts, and Star UML Diagram software for designing UML diagrams.

User analysis is intended to find out which users are involved in using the HIMPAUDI website so that the level of user understanding of computers can be known. System users are HIMPAUDI operators and the public. HIMPAUDI operators consist of 3 levels, namely institutional operators (village/ward level), sub-district level operators, and district level operators. The public are all people who want to get information about the profile, agenda, and news about HIMPAUDI.

TABLE IV: System Users

User	Access Rights	Classification
Admin (Operator of HIMPAUDI of Regency)	*Input* *Read* *Update* *Delete*	Have basic computer skills. Can operate Microsoft Windows operating system. Can operate internet access devices. Processing agendas, news and data to be uploaded or reported by HIMPAUDI Sub-districts and Institutions.
Operator of HIMPAUDI of Sub District	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Making news proposals, processing data reported by HIMPAUDI Institutions to HIMPAUDI of Regency
Operator of HIMPAUDI Institutions (Village/ Ward)	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Make data reporting to HIMPAUDI of Regency Making news proposals, processing data reported by HIMPAUDI Institutions
Visitor (HIMPAUDI Operator and public)	*Read*	Can operate internet access devices Get information about the profile, agenda, news, and secretariat of HIMPAUDI

The system design stage is carried out after conducting a system analysis so that the new system can run well and as expected. Good design will be able to overcome problems that have occurred so far and anticipate possible errors in the future. In the system design sub-chapter, context diagrams, data flow diagrams, database design, interface design, and system test designs will be described.

To better explain the system input and output functions of each user involved in the system, a Context Diagram will be described as shown in Figure 9.

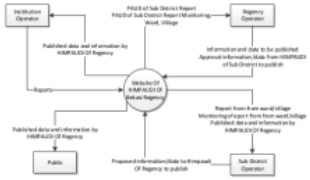


Fig. 9. Context Diagram

In the context of the diagram, it is illustrated that the HIMPAUDI of Bekasi Regency website is related to four external entities, namely the operator at the district operator who is responsible as an admin, the sub-district operator, the operator at the village and village level institutions, as well as website visitors, namely the community. Operators at the HIMPAUDI of Regency get a recap of reports from the system and get data on the results of monitoring reports from HIMPAUDI of Regency, and institutions from the system. Meanwhile, district operators can provide information and data to be published through the system and can give approval to proposed information or data sent from sub-districts and institutions. HIMPAUDI of Sub-District operators can provide information or data suggestions to be published in the system. HIMPAUDI of Sub-District can receive reports from sub-districts/villages, obtain monitoring data from sub-district and HIMPAUDI of Village/Ward reports, and obtain information and data published by HIMPAUDI of Regency. Sub-district and HIMPAUDI of Village/Ward operators can provide reports through the system and can receive information and data published by HIMPAUDI of Regency. The general public can receive information and data published by the HIMPAUDI of Regency.

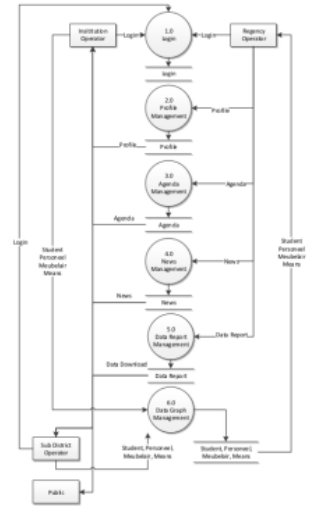


Fig. 10. Data Flow Diagram Level 1

In Figure 10 it can be seen that the HIMPAUDI of Bekasi Regency website consists of 6 main processes, namely Login/Logout, Profile Management, Agenda Management, News Management, Data Report Management, Data Graph Management.

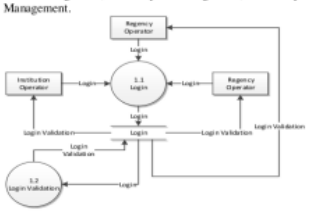


Fig. 11. Data Flow Diagram Level 2 Proses Login

In Figure 11 it can be seen that the Login Process consists of 2 processes, namely the Login Process and the Login Validation Process.

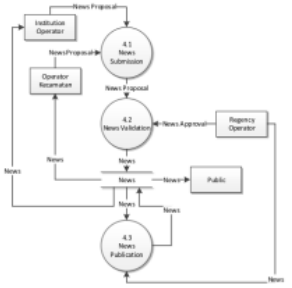


Fig. 12. Data Flow Diagram Level 2 - News Management Process

In Figure 12 it can be seen that the News Management Process consists of 3 processes, namely the News Receipt Process, the News Validation Process, and the News Publication Process.

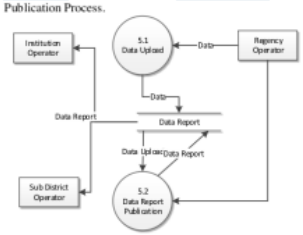


Figure 13: Data Flow Diagram Level 2 - Data Report Management Process

In Figure 13 it can be seen that the Data Management Process consists of 2 processes, namely the Data Upload Process and Data Report Publication.

Fig. 14. Data Flow Diagram Level 2 - Process Data Graph

In Figure 14 it can be seen that the Data Graph Process consists of 6 processes, namely the Institutional Data Submit process, the District Verification process, the District Recap process, the District Submit process, the Regency Verification process, and the Regency Recap process.

Navigation structure is the structure or storyline of a program that is usually used to link web pages based on the elements used in web applications. The navigation structure used in this study is a hierarchical navigation structure. The navigation structure of website visitors is shown in Figure 15 as follows:

Fig. 15. Navigation Structure

In this section, a database design will be made using Entity Relationship Diagrams and table structures described by the Physical Data Model. ERD is made to facilitate analysis and subsequent designs. ERD design is made by displaying the overall relationship between entities and the level of relationships between entities.

ERD describes database design at the conceptual level. Figure 16 illustrates the connectedness of entities on the HIMPAUDI of Bekasi Regency website.

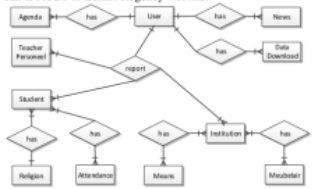


Fig. 16. Entity Relationship Diagram

Physical Data Model (PDM) describes database design at the physical level. Figure 17 illustrates the relationship between tables on the HIMPAUDI of Bekasi Regency website.

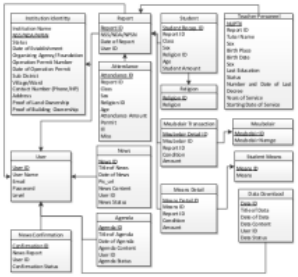


Fig. 17. Physical Data Model

The structure of the HIMPAUDI website database table is described in Figure 18.

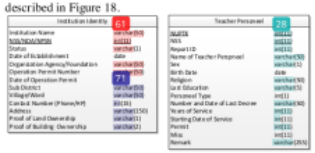


Fig. 18. Table Structure

Interface design or interface design is an important part of designing a system because the interface will relate directly to the user. Therefore, a good interface design and in accordance with aesthetics will make it easier for users to interact with the system to be developed. The design of the HIMPAUDI of Bekasi Regency website interface includes:

Fig. 19. Main Page Interface Design

Fig. 20. Data Reporting Page Interface Design

Fig. 21. Teacher and Personeel Data Page Interface Design

The HIMPAUDI website testing plan is carried out using black box testing, namely testing the functional system, with input given to the system whether it provides output as expected or not. Testing using localhost with the domain http://localhost/PAUD.

This stage is carried out to create a program by writing scripts using programming languages. Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor and data storage in MySQL.

Database implementation on phpmyadmin MySQL can be seen in Figure 22.

Fig. 22. Database Implementation

Implementation of the HIMPAUDI of Bekasi Regency website interface can be seen in Figure 23, Figure 24, Figure 25, Figure 26, Figure 27, Figure 28, and Figure 29.

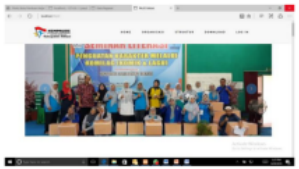


Fig. 23. Main Page Interface Implementation

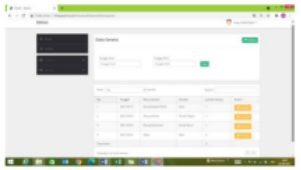


Fig. 24. Implementation of the Means Page Interface

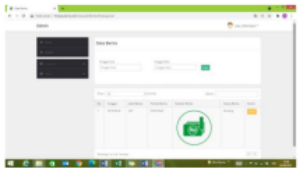


Fig. 25. News Page Interface Implementation

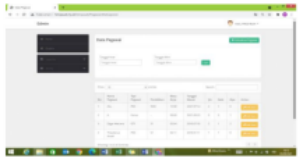


Fig. 26. Implementation of the Personeel Data Reporting Page Interface

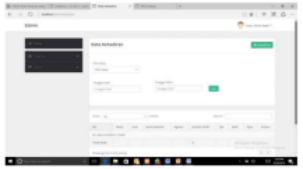


Fig. 27. Implementation of the Personeel Data Graphics Page Interface

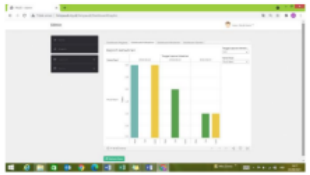


Fig. 28. Implementation of Student Attendance Data Page Interface

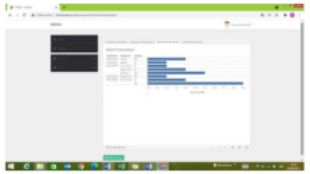


Fig. 29. Implementation of the Furniture Data Graphics Page Interface

The system test results are explained using a system test table that contains information about the Test Class, Input Data, Expected Results, Observation Results and Testing Conclusions.

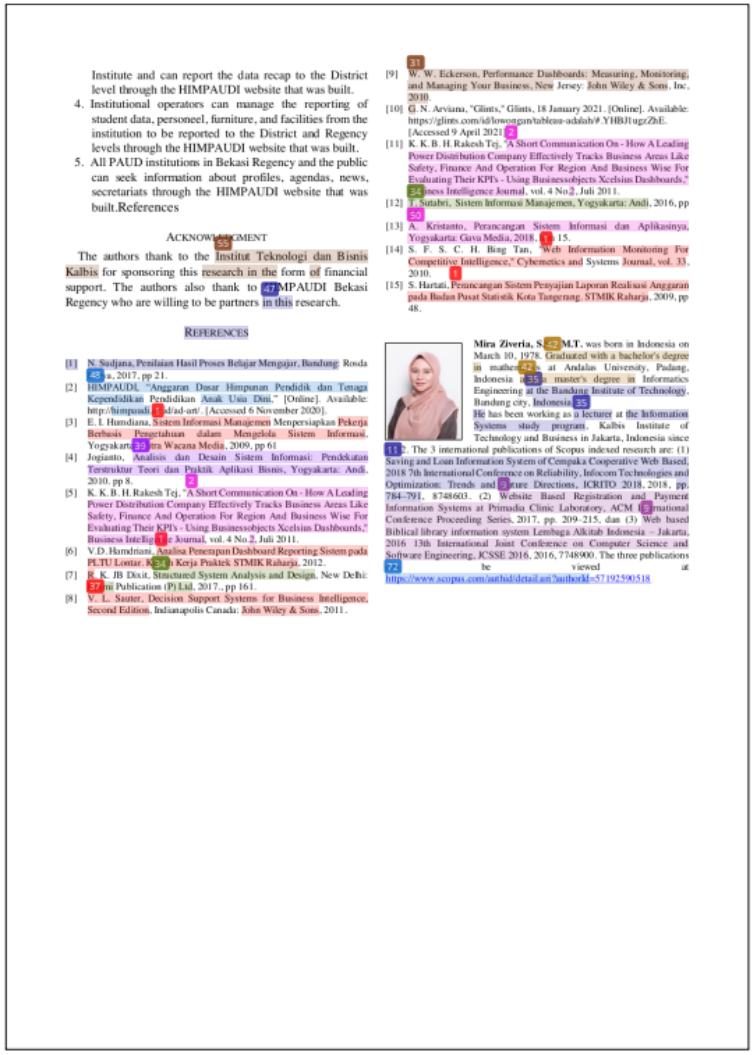
Based on the results of the tests that have been carried out, it can be concluded that the system is functionally able to produce the expected output. From the results of the tests carried out, it can be concluded that the HIMPAUDI website in Bekasi Regency is in accordance with what is expected. Although there are still many shortcomings, functionally the system created is in accordance with the basic needs of HIMPAUDI.

The last stage of the development of the HIMPAUDI website is system management, namely by uploading web hosting with the domain http://himpaudi.my.id and submitting the website to HIMPAUDI of Bekasi Regency.

V. Conclusion

The conclusions that can be drawn from the research on Website Development of HIMPAUDI of Bekasi Regency as PAUD Reporting Support are as follows:

1. The HIMPAUDI of Bekasi Regency website as PAUD Reporting Support can be developed using the System Development Life Cycle development method.
2. District operators can manage information regarding profiles, agendas, news, secretariat, monitoring data, and reporting data on students, personeel, furniture, and facilities from the Institutional and District level through the HIMPAUDI website that was built.
3. Sub-district operators can manage data reporting on students, personeel, furniture, and facilities from the



Institute and can report the data recap to the District level through the HIMPAUDI website that was built.

4. Institutional operators can manage the reporting of student data, personeel, furniture, and facilities from the institution to be reported to the District and Regency levels through the HIMPAUDI website that was built.
5. All PAUD institutions in Bekasi Regency and the public can seek information about profiles, agendas, news, secretariats through the HIMPAUDI website that was built.References

ACKNOWLEDGMENT

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Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

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Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

Mira Ziveria, Lufty Abdillah, and Salman

Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini **(Association of Early Childhood Educators and Personnel of Education or HIMPAUDI) of Bekasi Regency is a group of 1680 entities of *Pendidikan Anak Usia Dini* (Early Childhood Education Programs or PAUD) spread across 23 sub-districts, 187 villages and 176 villages. HIMPAUDI Bekasi Regency strives to realize the application of computer technology to evaluate routine reports from PAUD educational institutions every month. At this time there are still many obstacles in processing reports into a form that is easy to understand. This study aims to build a computer-based system in reporting activities at HIMPAUDI Bekasi Regency which is useful for making it easier for each PAUD to send reports to the Regency HIMPAUDI, making it easier for District HIMPAUDI to monitor and recap all reports, and facilitate the analysis of HIMPAUDI reports for Bekasi Regency. The report system built is a web-based system that uses Business Intelligence technology to analyze reports so that reports uploaded in the form of excel files can be automatically recapitulated by the system into graphs that can be viewed based on parameters such as year, age, study group, and so on. The website development method uses the System Development Life Cycle (SDLC) which starts with data collection, system analysis and design, implementation, testing and system maintenance. The result of the research is a web-based Business Intelligence application to support PAUD reports in Himpaudi Bekasi Regency which is submitted and then managed by Himpaudi of Bekasi Regency.**

***Index Terms*—Business Intelligence, reports, SDLC, web.**

I. Introduction

In this section, the researcher explains the background, problem formulation, objectives, and benefits of this research.

A. Background

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. The HIMPAUDI Secretariat of Bekasi Regency is located at Jalan MT Haryono No.26, Taman Rahayu Village, Setu District, Bekasi Regency, West Java Province. The number of PAUD in Bekasi Regency is 1,680 PAUD consisting of 976 TK/RA (kindergarten/*raudhatul athfal*), 574 KB (playgroup), 14 TPA (child care), and 116 SPS (similar PAUD unit) [1].

HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports.

HIMPAUDI of Bekasi Regency strives to realize the application of computer technology to recapitulate routine reports from PAUD educational institutions every month. It takes a system that can accommodate these reports in a practical and efficient manner in obtaining the results of report analysis and reports can be presented in a neat and attractive manner. Reports that are routinely sent every month include student, teacher, and personeel data. Student data sent includes identity, class, last month's student condition, current month's student condition, attendance, PAUD facilities and infrastructure, and others. Teacher and personeel data includes identities such as last education, status, decree, years of service, attendance, and others.

Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports.

The problem in the research is how to build an application that applies Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency so that it can make it easier for every PAUD to send reports to HIMPAUDI, HIMPAUDI is easy to monitor, recapitulate, and reports uploaded in excel files can be recapitulated automatically. automatically by the system into a graphical form that can be viewed based on the desired parameters.?

The specific purpose of this research is to build a web-based application by applying Business Intelligence technology to support PAUD reports at HIMPAUDI of Bekasi Regency with the SDLC development method which will later be submitted and implemented and managed by HIMPAUDI of Bekasi Regency so that the process of monitoring report recapitulation can be processed by the system with good processing quality, reducing error rates, saving time and costs, and helping the performance of HIMPAUDI of Bekasi Regency.

Researchers under the auspices of the Institut Teknologi dan Bisnis Kalbis have collaborated with HIMPAUDI of Bekasi Regency since 2016 for research activities and community service. Based on observations and analysis results, researchers can identify the needs of partners, one of which is a problem in reporting data from PAUD throughout Bekasi Regency, which number in the thousands to HIMPAUDI Regency every month. In 2019 researchers conducted research on PAUD data reporting at HIMPAUDI of Bekasi Regency by building a website whose one function was to support data reporting, but the resulting system did not help much because the report was not analyzed by the system, making it difficult to understand.

Based on this, in this research proposal, the researcher tries to use Business Intelligence technology so that PAUD reports uploaded in excel files can be recapitulated automatically by the system into graphic form that can be viewed based on the desired parameters such as year, age, study group, and so on.

B. Formulation of the Problem

C.The formulation of the problem in this research is to use business intelligence technology to support web-based PAUD reports in HIMPAUDI, Bekasi Regency *Based on the above background, the formulation of the problem in this research is how to build a system by utilizing Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency?*

D.C Limitation of the Problem

Limitations of the problem in this research are:

1. The research was conducted in HIMPAUDI of Bekasi Regency, therefore the system design was adapted to the current condition of Himpaudi.
2. Development of a website as a means of conveying HIMPAUDI information including profiles, agendas, news, data, and the Himpaudi secretariat.
3. Development of a website as a means for reporting PAUD to HIMPAUDI covering data on students, educators and education staff, as well as facilities and infrastructure.

E.D Purposes of Research

The purpose of this research is to produce a web-based system for HIMPAUDI of Bekasi Regency which is managed by HIMPAUDI of Bekasi Regency administrators to be used by PAUD to provide reports to HIMPAUDI, can be monitored by HIMPAUDI of Bekasi Regency and can be recapitulated automatically by the system into a graphic form that can be viewed based on parameters by applying Business Intelligence technology with the System Development Life Cycle (SDLC) method and using the PHP programming language and MySQL database as well as XAMPP and Tableau software.

F.E Benefits of Research

The development of the Bekasi Regency HIMPAUDI website can provide the following benefits:

1. For HIMPAUDI of Bekasi Regency, among others: (a) HIMPAUDI management can publish information related to their agencies through the website, (b) HIMPAUDI management can monitor and obtain PAUD reports, and can automatically recapitulate through the system into a graphic form that can be viewed based on several parameters, (c) PAUD administrators at the sub-district level can easily report to district-level administrators through the system.
2. For the community, among others: (a) Get information quickly and easily about HIMPAUDI of Bekasi Regency, (b) Educate the public to be able to find information about HIMPAUDI through the website.

II. Literature Review

In this section, the researcher explains the theory, perspective, literature review and previous research related to the topic of this research.

A Early Childhood Education ProgramsHIMPAUDI

Early childhood education programs is one of the coaching efforts aimed at children from birth to the age of six which is carried out through the provision of educational stimuli to shape physical and spiritual growth and development so that children have readiness to enter further education levels. In Law No. 20 of 2003 concerning the National Education System, it is explained that what is included in early childhood education in the formal education pathway is TK (kindergarten), *Raudhatul Athfal* (RA) or an equivalent form,

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Manuscript received October 9, 2001. (Write the date on which you submitted your paper for review.) This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here). Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Ni-Fe-Mo"). Do not write "(invited)" in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors' initials.

F. A. Author is with the National Institute of Standards and Technology, Boulder, CO 80305 USA (e-mail: author@boulder.nist.gov).

S. B. Author was with Rice University, Houston, TX 77005 USA. He is now with the Department of Physics, Colorado State University, Fort Collins, CO 80523 USA (e-mail: author2@lamar.colostate.edu).

T. C. Author is with the Electrical Engineering Department, University of Colorado, Boulder, CO 80309 USA, on leave from the National Research Institute for Metals, Tsukuba, Japan (e-mail: author3@nrim.go.jp).

while what is included in education is early childhood through non-formal channels such as *Kober* (playgroup), TPA (Child Care) or similar PAUD units [2].

HIMPAUDI is an independent organization that brings together elements of early childhood educators and education personnel. Association of Early Childhood Educators and Personnel of Education or abbreviated HIMPAUDI (*Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini*) is a professional organization that houses non-formal PAUD educators and education personnel. HIMPAUDI has the duty and role to facilitate PAUD educators in developing all their potential, especially in terms of developing their competence as PAUD educators so that they are able to provide educational services for early childhood optimally in accordance with what is stated in HIMPAUDI's vision, namely realizing educators and education personnel for young children. strong, professional, and noble character [23].

B. Basic Concepts of Information Systems

The system is a network of interconnected procedures and procedures that gather together to carry out an activity or complete a certain target [3].

The system is the elements that are interrelated and work together to process the input or input addressed to the system and process the input to produce the desired output or output. The elements contained in the system include: [4]

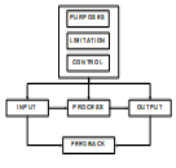

Fig. 1. Element of System

Based on the theory that has been put forward, researchers can conclude that the system is an element that is interconnected to achieve a certain goal. From Figure 3 above, it can be explained that the objectives, limitations and control of the system will affect the process input and output. Inputs that enter the system will be processed and processed to produce output. The output will be analyzed and will become feedback for the recipient and from this feedback will emerge all kinds of considerations for further input. Furthermore, this cycle will continue and develop according to the existing problems.

Data that is processed through a model becomes information, the recipient of the information then receives the information, makes a decision and takes action, resulting in another action that makes some data back. The data is inputted, reprocessed through a model and so on to form a cycle. This cycle by John Burch is called the information cycle [3].

Information is a collection of data or facts that are organized in a certain way so that they have meaning for the recipient. The quality of information depends on three things, namely the information must be accurate, timely, and relevant. An information system is a system within an organization that brings together the daily transaction processing needs that support managerial organizational operations functions with strategic activities of an organization in order to be able to provide certain outside parties with the necessary reports. Information system components include input, model, output, technology, database, and control [5].

C. Web-Based Information System

A web-based information system is an information system that uses web or internet technology to support and facilitate human work to become more efficient. Because a web-based information system uses the help of the internet or web-based applications, it means that there are things that must be met to create this web-based information system such as HTML, CSS, Javascript web programming languages, the use of web servers, for example, the Apache web server and also a data storage warehouse or database. which you can create using Oracle or MySQL. The requirements for the formation of a website are: [6]

1. Availability of Web Server, either static or dynamic web. If you want to be online on the internet, the first requirement must be to have a server, both hardware and software. Hardware is a set of computers that are always connected online to the internet. For software, apart from the operating system, software for the web server itself must also be provided. For now, the favorite web server is Apache.
2. Availability of Server-Based Web Programming Software. If you want to create a web, it means that a web programming language other than HTML must be available, both client side and server side. For the client side, it has a drawback that the program instructions can be seen by internet users. While the server side is more secure because the program instructions are not visible to the user, what is visible is like ordinary HTML. An example of a favorite web programming language is PHP.
3. Availability of Databases. Database is software used to store and manage data. If you have a little data, maybe you can still use ordinary files as storage media. But if the data is already very much, without a database it will be very convulicated. Databases can store millions of data and can be accessed very quickly. Examples of databases that can be used to create a web are Oracle, MySQL, and many others. The database that will be used by the author is MySQL.

D. Business Intelligence (BI)

BI is a collection of techniques and tools for transforming raw data into useful and meaningful information for business analysis purposes. BI technology can handle huge amounts of unstructured data to help identify, develop, and otherwise create new business strategic opportunities. The purpose of BI is to facilitate the interpretation of this large amount of data. Identifying new opportunities and implementing an effective strategy based on insights can provide a business with a competitive market advantage and long-term stability.

BI is the process of using the power of people and technology to collect and analyze data for use by organizations in strategic and day-to-day decision-making processes. Thus, the process involved involves collecting data into a data warehouse or other data warehouses. Next, the company will use special tools to analyze the data. The essence of BI is the process of taking raw data that most people cannot understand, and then processing it by converting raw data into understandable information so that data users can carry out their work properly.

The main goal of BI is to drive better and quality business decisions. In this way, the company can increase its revenue, improve business operational efficiency, and gain a competitive advantage in the midst of market competition. And to achieve this goal, BI uses a series of analyzes that are combined according to the purpose and needs of their use, data management tools and data reporting, along with various methodologies for managing and analyzing data.

In a BI architecture, we can not only find BI software. BI data is generally stored in data warehouses created for the entire company, as well as in smaller spaces that contain pieces of business information, for example for each division or business unit. However, all of these parts are related to the data warehouse of the company as a whole.

BI data can be in the form of historical information or real-time data, all of which is gathered from the source system as it is generated. Therefore, tools in BI can support strateeic and tactical (daily) decision-making processes. The raw data collected from various source systems need to be integrated first, as well as combined and cleaned using data integration tools and data quality management tools. Its purpose is to ensure that its users obtain accurate and consistent information in the business analysis process. [7]

The BI process involves the following steps:

1. Integration of data from source systems into a data warehouse or other data warehouse.
2. Preparation of data into analytical data models for analysis requirements.
3. Application of analytical queries to data by BI analysts and professional business analysts.
4. Creating data visualizations, dashboards, reports, and so on using query results.
5. Use of information for corporate strategic planning and decision making.

E. Decision Support Systems

Decision Support System (DSS) is defined as a computer-based system consisting of interacting components, namely language systems, knowledge systems, and problem processing systems. DSS is not a decision-making tool, but a system that helps decision makers by equipping them with information from data that has been processed relevantly and needed to make decisions about a problem more quickly and accurately. DSS is intended to help decision makers to solve semi- and or unstructured problems with a focus on presenting information that can later be used as the best alternative decision-making material. [8]

The Decision Support System consists of 3 main components, namely:

1. Database, is a component of a decision support system providing data for the system. The data is stored in a database organized by a system called the Database Management system/DBMS.
2. Model
3. Dialog (User System Interface)

F. Dashboard System

Dashboard is an application that serves to display performance-related information for company managers. The dashboard concept has been around for years and has been adopted by many companies around the world. Dashboard is a visual representation containing important information needed to achieve goals and can be arranged on one screen so that it will be easier for users to monitor it. Meanwhile, the information dashboard is a visual display containing important information needed to achieve goals by organizing information on one screen so that organizational performance can be monitored [9].

There are three types of dashboards, namely:

1. Strategic Dashboard

Strategic dashboards are useful to support strategic level management in obtaining information to make business decisions, predict opportunities, and provide direction in achieving strategic goals.

2. Tactical Dashboard

Tactical dashboards focus on the analysis process to determine the cause of a particular condition. This dashboard serves to measure short-term productivity and effectiveness whose results are often used by individual contributors.

3. Operational Dashboard

Operational dashboards are useful to support monitoring of specific business process activities in their daily life. This dashboard measures the short-term effectiveness of specific business functions at the team or business unit level.

G. Tableau

Tableau is a tool that can facilitate the creation of interactive visual analysis in the form of a dashboard. Another definition of Tableau is that Tableau is software that supports collaborative data visualization for someone who works in analyzing business information. From the two definitions above, it can be concluded that Tableau is software that can process data into an attractive visual. That way, the data set will be easier to understand. Tableau has various advantages that can be taken into account when visualizing data in the form of graphs or dashboards. Some of Tableau's advantages include interactive visual options, user friendly, processing multiple data sources, mobile friendly dashboard, and integration with scripting languages. Tableau combines SQL in the database with a descriptive language to create graphs and creates a database visualization language called VizQL. The version used by the researcher is Tablau Public which is free and can be used by anyone. [10]

B.H Reports

One of the important points in this research is how to process and integrate a report. The following is the definition of a report according to several experts: A report is a form of presenting facts about a situation or activity. The facts presented relate to the responsibilities assigned to the reporter [34].

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According to Rakesh TK, "Reporting Solution is to deliver and implement a consistent, personalized information delivery system that includes performance data (key performance indicators) which are relevant, accurate and transparent for use by regional management and executives to enable decision making each month [5], [5]

Can be interpreted as, a report is a collection of data in which it is formed based on relevant, accurate and transparent KPIs (key performance indicators) to be used by management or executives in making decisions on a monthly basis. Report types can be grouped based on a certain time, namely Regular/Periodic Reports, Special/Exception Reports, Unscheduled Reports, Special Analysis Reports, Process Inquiry Reports [116].

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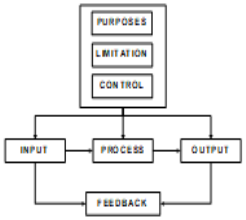

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Data that is processed through a model becomes information, the recipient of the information then receives the information, makes a decision and takes action, resulting in another action that makes some data back. The data is inputted, reprocessed through a model and so on to form a cycle. This cycle by John Burch is called the information cycle [7].

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E. System Development Life Cycle (SDLC)

SDLC is a pattern taken to develop a software system, which consists of the following stages: system planning (planning), analysis (analysis), design (design), implementation (implementation), testing (testing) and management (maintenance). In software engineering, the concept of SDLC underlies many types of software development methodologies. SDLC stages are as follows [1210]:

1. System planning system (planning), more emphasis on aspects of the feasibility study of system development (feasibility study).
2. System Analysis (analysis). The project objectives refine into defined functions and operations of the intended application. Analyze the end user required information.
3. System Design (design). Describes the desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudo and other documentation.
4. System Implementation (implementation). Implement the design from the previous stages and conduct trials.
5. System testing (testing), namely testing the system that has been made.
6. System Management (maintenance). It is carried out by the appointed admin to keep the system able to operate properly through the system's ability to adapt itself according to needs.

F. User Acceptance Test (UAT)

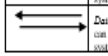
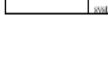
UAT is a testing process carried out by the user with the output of a test result document that can be used as evidence that the software has been accepted and has met the requested requirements. The UAT is not much different from the questionnaire in the early stages of making the application.

UAT is a verification process that the solution created in the system is suitable for the user. This process is different from testing the system (making sure the software doesn't crash and conforms to the user's request documents), but rather making sure that the solution in the system will work for the user, testing that the user accepts the solution in the system. UAT is generally performed by the client or end user, usually focusing not on the identification of simple problems such as spelling errors, nor on showstopper defects, such as software crashes. Testers and developers identify and fix these problems during the early stages of functionality testing, during integration testing and at the system testing stage [10].

G. Data Flow Diagram (DFD)

DFD is a diagram that uses notation to describe the flow of data in a system, whose use is very helpful for understanding the system logically, structured and clearly. DFD can also be used as a tool in describing or explaining the work process of a system. DFD is a system design tool that is oriented to the flow of data with a decomposition concept that can be used for describing analysis and system design that is easily communicated by system professionals to users and program makers. There are 3 levels of DFD, namely Context Diagram, Zero Diagram (Level 1 Diagram), and Detailed Diagram [48].

TABLE I: Data Flow Diagram Notation

SYMBOL	REMARKS
	*External Entity* is a unit (entity) in the system environment which can be in the form of people, organizations or other systems in the external environment that will provide input or output from the system.
	*Data Flow* shows the flow of data which can be input to the system or the results of system processes
	*Process* are activities or work carried out by people, machines or computers from the results of a data flow that enters the process to produce data flows that will come out of the process.
	Data Store is from data that can be in the form of a database on a computer system, an archive, manual notes, an agenda, or a book

H. Entity Relationship Diagram (ERD)

In the ERD model, the universe of data that exists in the real world is translated by utilizing a number of conceptual tools into a data diagram, which is generally referred to as an Entity-Relationship Diagram (E-R Diagram). The Entity-Relationship model is formed from two components, namely entities (entities) and relationships (relation). These two components are further described through a number of attributes. ERD was first described by Peter Chen which was created as part of the CASE software. The notations used in ERD are entities, relationships, attributes and lines [124].

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K. Dashboard System

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a visual representation containing important information needed to achieve goals and can be arranged on one screen so that it will be easier for users to monitor it. Meanwhile, the information dashboard is a visual display containing important information needed to achieve goals by organizing information on one screen so that organizational performance can be monitored [13].

There are three types of dashboards, namely:
1. Strategic Dashboard

Strategic dashboards are useful to support strategic level management in obtaining information to make business decisions, predict opportunities, and provide direction in achieving strategic goals.

2. Tactical Dashboard

Tactical dashboards focus on the analysis process to determine the cause of a particular condition. This dashboard serves to measure short-term productivity and effectiveness whose results are often used by individual contributors.

3. Operational Dashboard

Operational dashboards are useful to support monitoring of specific business process activities in their daily life. This dashboard measures the short-term effectiveness of specific business functions at the team or business unit level.

K.Tableau

Tableau is a tool that can facilitate the creation of interactive visual analysis in the form of a dashboard. Another definition of Tableau is that Tableau is software that supports collaborative data visualization for someone who works in analyzing business information. From the two definitions above, it can be concluded that Tableau is software that can process data into an attractive visual. That way, the data set will be easier to understand. Tableau has various advantages that can be taken into account when visualizing data in the form of graphs or dashboards. Some of Tableau's advantages include interactive visual options, user friendly, processing multiple data sources, mobile friendly dashboard, and integration with scripting languages. Tableau combines SQL in the database with a descriptive language to create graphs and creates a database visualization language called VizQL. The version used by the researcher is Tableau Public which is free and can be used by anyone. [14]

L.M Previous Research

In this sub-chapter, previous research that is relevant to the research conducted by the researcher will be discussed. The results of the researcher's observations regarding "Development of the Bekasi Regency Himpaudi Website as Support for PAUD Reportine" have never been carried out, but there are several similar topics that have been carried out, including the following:

1. "Aplikasi *Intelligence Website untuk Penunjang Laporan PAUD pada HIMPAUDI Kota Tangerang*" by Dina Fitria Murad, Nia Kusniawati, and Agus Asyanto from STMIK Raharja that published in the CCIT Journal Vol.7 No.1 September 2013 [153].
2. "Web Information Monitoring for Competitive Intelligence" by Bing Tan, Schubert Foo, and Siu Cheung Hui from School of Computer Engineering, Nanyang Technologycal University, Nanyang Avenue, Singapore that published in the International Journal Cybernetics and System Vol.33, November 2010 [146].
3. "Perancangan Sistem Penyajian Laporan Realisasi Anggaran pada Badan Pusat Statistik Kota Tangerang" by Sudi Hartati from STMIK Raharja in 2009 [155].

III. Research Metodology

The method of collecting data in this study was to conduct interviews with several PAUD and HIMPAUDI administrators in Bekasi Regency and make direct observations to see the implementation of reporting and also how HIMPAUDI disseminates information to PAUD and the community regarding the profile and activities carried out by HIMPAUDI or PAUD. Observations were made on August 1 and 17 2018 and took place at PAUD Pelita Rahayu, Setu District, which is the Secretariat of HIMPAUDI, Bekasi Regency and SPS Bhakti Pertiwi, Tarukan Selatan District, Bekasi Regency.

Based on interviews and observations made by researchers, researchers obtained information about the general description of HIMPAUDI of Bekasi Regency. The general description of HIMPAUDI contains a profile that includes the vision and mission, activities, management, organizational structure, as well as examples of reports that must be made and sent from PAUD to HIMPAUDI Regency which is carried out every month.

The website system development method in this study uses the System Development Life Cycle (SDLC) method starting from planning, analysis, design, implementation, testing and maintenance.

Fig. 2. Stages of System Development Life Cycle

Details of activities for each SDLC stage carried out in the study can be seen in Table 2.

TABLE II: Stages of Research

Stages of Research	Activites
System Planning	• PAUD and HIMPAUDI • Scope of HIMPAUDI of Bekasi Regency • Vision, Mission and Goals HIMPAUDI of Bekasi Regency • Organizational Structure of HIMPAUDI of Bekasi Regency • Secretariat of HIMPAUDI of Bekasi Regency
System Analysis	• Data Reporting from PAUD Village /Ward to HIMPAUDI of Bekasi Regency • Recapitulation of PAUD reports to HIMPAUDI of Bekasi Regency • Information Dissemination from HIMPAUDI Bekasi Regency to the Village/Ward Level • Weaknesses of the Running System • Feasibility study • System Functional Requirements Analysis • Analysis of Non-Functional System Requirements
System Design	• Context Diagram • Data Flow Diagrams (DFD) Level 1 and 2 • Database Design (Entity Relationship Diagram and Physical Data Model, Table Structure) • Interface Design • Hardware and Software Design
System Implementation	• Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor • Implementation of Data Visualization with Tableau • Database Implementation with MySQL
System Testing	• Testing using free Web Hosting with black box testing
System Management	• Rent Web Hosting and Domain • Upload to Web Hosting • System Usage Guide • Submission of the website to HIMPAUDI Bekasi Regency

This research activity was conducted at Institut Teknologi dan Bisnis Kalbis, Jalan Pulomas Selatan Kav 22, East Jakarta. This research was conducted for one year, starting from October 2020 to September 2021.

Solution business intelligence architecture for the system can be seen in the Figure 3.

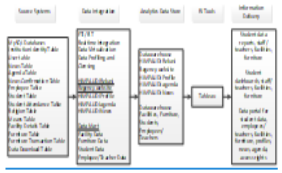

Fig. 3. Solution Business Intelligence Architecture

IV. Result and Discussion

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. An overview of the scope of HIMPAUDI in Bekasi Regency which oversees PAUDs in Village / Ward in Bekasi Regency can be seen in Figure 43.

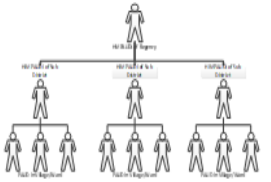

Fig. 43. Scope of HIMPAUDI of Bekasi Regency

The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports in a neat and attractive manner, as well as practical and effective in obtaining the results of the analysis of these reports. The types of reports that are routinely sent from each PAUD to the sub-district level and continued to the district level are reporting:

1. Report of Student Data
2. Report of Educator and Perangkat of Education.

The process of reporting PAUD from Village/Ward to HIMPAUDI Center (HIMPAUDI of Bekasi Regency) can be seen in Figure 54.

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Fig. 45. Report of PAUD to HIMPAUDI of Bekasi Regency

An example of a student data reporting form from PAUD at the village/ward level to the sub-district level can be seen in Figure 65 and an example of reporting data on educators and education personnel from PAUD at the village/ward level to the sub-district level and from the sub-district to the district level can be seen in Figure 76.

Fig. 64. Report of Student Data from PAUD in Village/Ward to HIMPAUDI in Sub-District

Fig. 76. Report of Educator and [redacted] of Education in Sub-[redacted] to District Level

Dissemination of information such as news, agenda, and data from HIMPAUDI Bekasi Regency to the Village/Ward Level or to the wider community is carried out in several ways and the media. The method is carried out such as holding a meeting or meeting by inviting the chairperson, operators, educators and education staff to the District HIMPAUDI Secretariat. The media used are sending letters, brochures, banners, email, telephone, [redacted] messages, and others.

Fig. 12. Dissemination of Information HIMPAUDI of Bekasi Regency

In terms of disseminating information such as news, agendas, and data from HIMPAUDI of Bekasi Regency to the Village/Ward Level or to the wider community using media such as sending letters, brochures, banners, emails, telephones, [redacted] messages on the current system, the weaknesses are:

1. If using email, the HIMPAUDI operator at the Regency level must send it to all email addresses of all operators or leaders. This requires precision and a long time.
2. If you use a letter, it will take a long time to arrive at the Village/Ward level and also requires a mail delivery fee.
3. If using a banner, the range of information conveyed is limited only to people who see the banner. So with banners it is difficult to reach all PAUD in Bekasi Regency.
4. If you use a phone and [redacted] message, it will take a long time because you have to call all PAUD in Bekasi Regency.
5. Does not have an effective and efficient forum to convey information about profiles, agendas, news, and data from HIMPAUDI of Bekasi Regency to PAUD under it and the general public.

In terms of reporting data on students, educators, and education staff from PAUD at the Village/Ward level to the sub-district level and continued to the district level using an excel file that is printed and sent to the current system, the weaknesses are:

1. It takes a long time for the process of sending reports from PAUD at the Village/Ward level to arrive at HIMPAUDI District.
2. It takes a long time to process data recording at the sub-district level because it must accumulate all data from the village/ward level PAUD.
3. The accuracy of reporting data and data recapitulation at the sub-district level is not guaranteed because they have to manually recap reports from PAUD-PAUD at the Village/Ward level.
4. Does not have an effective and efficient forum for reporting data on students, educators, and education staff from PAUD at the Village/Ward level to HIMPAUDI, Bekasi Regency.

Based on observations made by researchers in the field, it can be seen that this research has never existed in the HIMPAUDI environment of Bekasi Regency. Based on the results of interviews conducted by researchers with the Head of HIMPAUDI of Bekasi Regency, Secretary [redacted] Bekasi Regency, and several PAUD chairpersons and operators in Bekasi Regency, research to build the Bekasi Regency HIMPAUDI website using business intelligence technology to support PAUD reporting has never been carried out and is very feasible for realized because the system that the researcher will do is one solution to increase the speed and accuracy of delivering information from HIMPAUDI Regency to the Village/Ward level and also for reporting data from PAUD Village/Ward to HIMPAUDI Regency to be more effective and efficient.

Functional requirements are requirements that must be met so that a system can run as expected. The functional requirements that must exist on the Bekasi Regency Himpaudi website to be developed are described in Table 4.

TABLE III: System Functional Requirements

User	Functional Requirements
HIMPAUDI Regency	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as HIMPAUDI Regency operator • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of graphs, namely dashboards for personnel attendance, student attendance, furniture, and facilities based on the required parameters • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of tables, namely tables of personnel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from sub-district and sub-district early childhood in pdf format • Can manage news to be published to sub-district, sub-district/village early childhood • Can manage agendas that will be published to sub-district, ward/village early childhood education • Can manage user access rights for village/ward, sub-district, and district levels
HIMPAUDI Sub- District	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and information on the Bekasi Regency HIMPAUDI secretariat • Can log in and log out as a sub-district HIMPAUDI operator • Can receive and monitor recap reports from sub-district early childhood education in graphic form, namely dashboard of personnel attendance, student attendance, furniture, and facilities based on required parameters • Can receive and monitor the recap of reports from the PAUD of Village/Ward in the form of tables, namely tables of personnel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from the PAUD of Village/Ward in pdf format • Can provide news proposals to district preschools for publication • Can receive information published by district preschools, including profiles, agendas, news, and downloadable data
HIMPAUDI Ward/Village	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as a sub-district/village HIMPAUDI operator • Can send reports to sub-districts and districts in the form of student attendance data, personnel attendance, furniture and facilities data • Can provide news proposals to district preschools for publication
General Public	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency

Non-functional requirements include hardware requirements and software requirements. The hardware that will be used is utilizing the hardware already owned by HIMPAUDI operators and the community. HIMPAUDI operators include operators at the institutional, sub-district, and district levels. The number and specifications of the hardware owned already support the operation of the designed system. While using manual reporting using an excel file, the operator is already using a computer or laptop whose specifications vary.

The hardware that can be used in the system made are: (1) PC, (2) VGA monitor has a minimum resolution of 800 x 1200 pixels, (3) Keyboard and mouse to perform user activities, (4) Internet broadband, (5) All the hardware used is a standard device in a computer system as well as for internet connections.

The software used in this research process as follows: (1) Hardware in the form of a computer set with specifications Processor Intel® CORE™ i5-2450M, CPU @ 2.5 GHz, 4.0 GB RAM, (2) Software in the form of Microsoft Windows 8, Microsoft Office 2010, Notepad++ application as a text editor, MySQL as database software, XAMPP server as a web server, Microsoft Visio software for creating flowcharts, and Star UML Diagram software for designing UML diagrams.

User analysis is intended to find out which users are involved in using the HIMPAUDI website so that the level of user understanding of computers can be known. System users are HIMPAUDI operators and the public. HIMPAUDI operators consist of 3 levels, namely institutional operators (village/ward level), sub-district level operators, and district level operators. The public are all people who want to get

information about the profile, agenda, and news about HIMPAUDI.

TABLE IV. System Users

User	Access Rights	Classification
Admin (Operator of HIMPAUDI of Regency)	*Input* *Read* *Update* *Delete*	Have basic computer skills. Can operate Microsoft Windows operating system. Can operate internet access devices. Processing agendas, news and data to be uploaded or reported by HIMPAUDI Sub-districts and Institutions.
Operator of HIMPAUDI of Sub District	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Making news proposals, processing data reported by HIMPAUDI Institutions to HIMPAUDI of Regency
Operator of HIMPAUDI Institutions (Village/ Ward)	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Make data reporting to HIMPAUDI of Regency Making news proposals, processing data reported by HIMPAUDI Institutions
Visitor (HIMPAUDI Operator and public)	*Read*	Can operate internet access devices Get information about the profile, agenda, news, and secretariat of HIMPAUDI

The system design stage is carried out after conducting a system analysis so that the new system can run well and as expected. Good design will be able to overcome problems that have occurred so far and anticipate possible errors in the future. In the system design sub-chapter, context diagrams, data flow diagrams, database design, interface design, and system test designs will be described.

To better explain the system input and output functions of each user involved in the system, a Context Diagram will be described as shown in Figure 98.

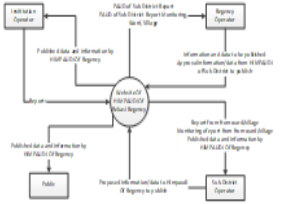


Fig. 98. Context Diagram

In the context of the diagram, it is illustrated that the HIMPAUDI of Bekasi Regency website is related to four external entities, namely the operator at the district operator who is responsible as an admin, the sub-district operator, the operator at the village and village level institutions, as well as website visitors, namely the community. Operators at the HIMPAUDI of Regency get a recap of reports from the system and get data on the results of monitoring reports from HIMPAUDI of Regency, and institutions from the system. Meanwhile, district operators can provide information and data to be published through the system and can give approval to proposed information or data sent from sub-districts and institutions. HIMPAUDI of Sub-District operators can provide information or data suggestions to be published in the system. HIMPAUDI of Sub-District can receive reports from sub-districts/villages, obtain monitoring data from sub-district and HIMPAUDI of Village/Ward reports, and obtain information and data published by HIMPAUDI of Regency. Sub-district and HIMPAUDI of Village/Ward operators can provide reports through the system and can receive information and data published by HIMPAUDI of Regency. The general public can receive information and data published by the HIMPAUDI of Regency.

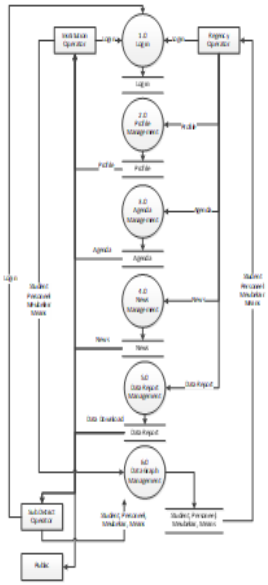


Fig. 109. Data Flow Diagram Level 1

In Figure 109 it can be seen that the HIMPAUDI of Bekasi Regency website consists of 6 main processes, namely Login/Logout, Profile Management, Agenda Management, News Management, Data Report Management, Data Graph Management.

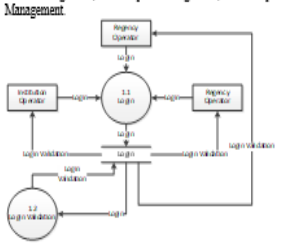


Fig. 101. Data Flow Diagram Level 2 Proses Login

In Figure 110 it can be seen that the Login Process consists of 2 processes, namely the Login Process and the Login Validation Process.

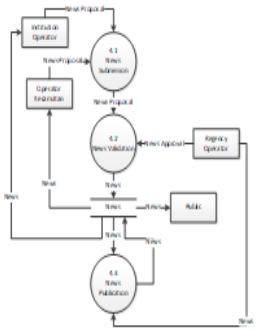


Fig. 124. Data Flow Diagram Level 2 - News Management Process

In Figure 124 it can be seen that the News Management Process consists of 3 processes, namely the News Receipt Process, the News Validation Process, and the News Publication Process.

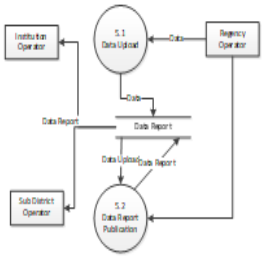


Figure 132. Data Flow Diagram Level 2 - Data Report Management Process

In Figure 12-13 it can be seen that the Data Management Process consists of 2 processes, namely the Data Upload Process and Data Report Publication.

Fig. 144. Data Flow Diagram Level 2 - Process Data Graph

In Figure 134 it can be seen that the Data Graph Process consists of 6 processes, namely the Institutional Data Submit process, the District Verification process, the District Recap process, the District Submit process, the Regency Verification process, and the Regency Recap process.

Navigation structure is the structure or storyline of a program that is usually used to link web pages based on the elements used in web applications. The navigation structure used in this study is a hierarchical navigation structure. The navigation structure of website visitors is shown in Figure 154 as follows:

Fig. 154. Navigation Structure

In this section, a database design will be made using Entity Relationship Diagrams and table structures described by the Physical Data Model. ERD is made to facilitate analysis and subsequent designs. ERD design is made by displaying the overall relationship between entities and the level of relationships between entities.

ERD describes database design at the conceptual level. Figure 15-16 illustrates the connectedness of entities on the HIMPAUDI of Bekasi Regency website.

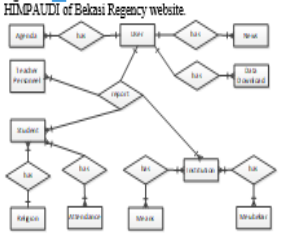


Fig. 156. Entity Relationship Diagram

Physical Data Model (PDM) describes database design at the physical level. Figure 176 illustrates the relationship between tables on the HIMPAUDI of Bekasi Regency website.

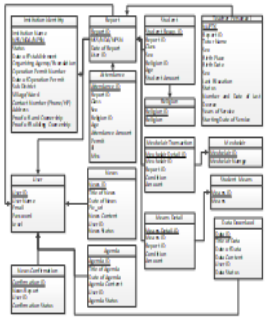
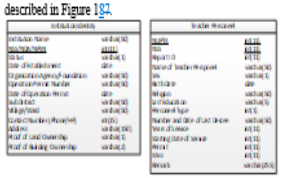


Fig. 162. Physical Data Model

The structure of the HIMPAUDI website database table is described in Figure 187.



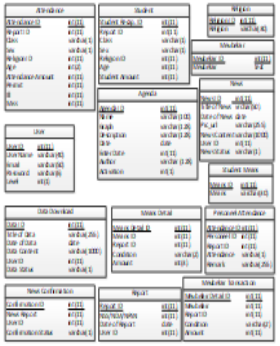


Fig. 187. Table Structure

Interface design or interface design is an important part of designing a system because the interface will relate directly to the user. Therefore, a good interface design and in accordance with aesthetics will make it easier for users to interact with the system to be developed. The design of the HIMPAUDI of Bekasi Regency website interface includes:

Fig. 198. Main Page Interface Design

Fig. 2049. Data Reporting Page Interface Design

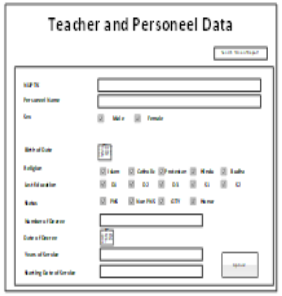


Fig. 210. Teacher and Personeel Data Page Interface Design

The HIMPAUDI website testing plan is carried out using black box testing, namely testing the functional system, with input given to the system whether it provides output as expected or not. Testing using localhost with the domain http://localhost/PAUD.

This stage is carried out to create a program by writing scripts using programming languages. Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor and data storage in MySQL.

Database implementation on phpmyadmin MySQL can be seen in Figure 221.

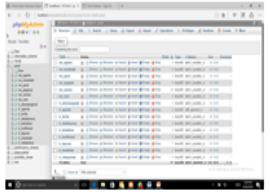


Fig. 242. Database Implementation

Implementation of the HIMPAUDI of Bekasi Regency website interface can be seen in Figure 232, Figure 243, Figure 254, Figure 256, Figure 267, Figure 278, and Figure 289.

Fig. 213. Main Page Interface Implementation

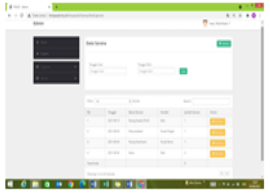


Fig. 344. Implementation of the Means Page Interface

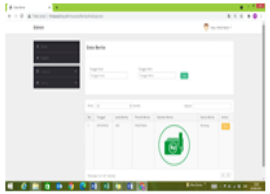


Fig. 25. News Page Interface Implementation

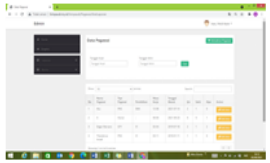


Fig. 26. Implementation of the Personnel Data Reporting Page Interface

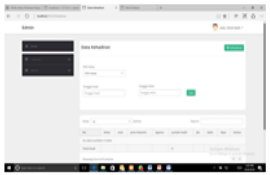


Fig. 27. Implementation of the Personnel Data Graphics Page Interface

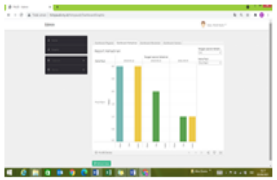


Fig. 28. Implementation of Student Attendance Data Page Interface

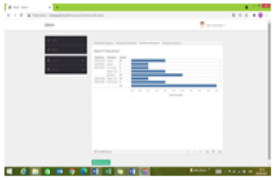


Fig. 29. Implementation of the Furniture Data Graphics Page Interface

The system test results are explained using a system test table that contains information about the Test Class, Input Data, Expected Results, Observation Results and Testing Conclusions.

Based on the results of the tests that have been carried out, it can be concluded that the system is functionally able to produce the expected output. From the results of the tests carried out, it can be concluded that the HIMPAUDI website in Bekasi Regency is in accordance with what is expected. Although there are still many shortcomings, functionally the system created is in accordance with the basic needs of HIMPAUDI.

The last stage of the development of the HIMPAUDI website is system management, namely by uploading web hosting with the domain http://himpaudi.my.id and submitting the website to HIMPAUDI of Bekasi Regency.

V. Conclusion

The conclusions that can be drawn from the research on Website Development of HIMPAUDI of Bekasi Regency as PAUD Reporting Support are as follows:

1. The HIMPAUDI of Bekasi Regency website as PAUD Reporting Support can be developed using the System Development Life Cycle development method.
2. District operators can manage information regarding profiles, agendas, news, secretariat, monitoring data, and reporting data on students, personeel, furniture, and facilities from the Institutional and District level through the HIMPAUDI website that was built.
3. Sub-district operators can manage data reporting on students, personeel, furniture, and facilities from the Institute and can report the data recap to the District level through the HIMPAUDI website that was built.
4. Institutional operators can manage the reporting of student data, personeel, furniture, and facilities from the institution to be reported to the District and Regency levels through the HIMPAUDI website that was built.
5. All PAUD institutions in Bekasi Regency and the public can seek information about profiles, agendas, news, secretariats through the HIMPAUDI website that was built.Referances

Acknowledgment

The authors thank to the Institut Teknologi dan Bisnis Kalbis for sponsoring this research in the form of financial support. The authors also thank to HIMPAUDI Bekasi Regency who are willing to be partners in this research.

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[15] S. Hartati, Perancangan Sistem Penyajian Laporan Realisasi Anggaran pada Badan Pusat Statistik Kota Tangerang, STMIK Raharja, 2009, pp 48.

Mira Kania, S.Si., M.T. was born in Indonesia on March 10, 1978. Graduated with a bachelor's degree in mathematics at Padjadjaran University, Padang, Indonesia and a master's degree in Informatics Engineering at the Bandung Institute of Technology, Bandung city, Indonesia.

He has been working as a lecturer at the Information Systems study program, Kalbis Institute of Technology and Business in Jakarta, Indonesia since 2012. The 3 international publications of Scopus indexed research are: (1) Saving and Loan Information System of Cemunia Cooperative Web Based, 2018 7th International Conference on Reliability, Infocom Technologies and Optimization: Trends and Future Directions, ICRITO 2018, 2018, pp. 784–791, 8748603. (2) Website Based Registration and Payment Information Systems at Primadia Clinic Laboratory, ACM International Conference Proceeding Series, 2017, pp. 209–215, dan (3) Web based Biblical library information system Lembuga Alkitab Indonesia - Jakarta, 2016 13th International Joint Conference on Computer Science and Software Engineering, JCSSE 2016, 2016, 7748900. The three publications can be viewed at https://www.scopus.com/authid/detail.uri?authorId=57192590518

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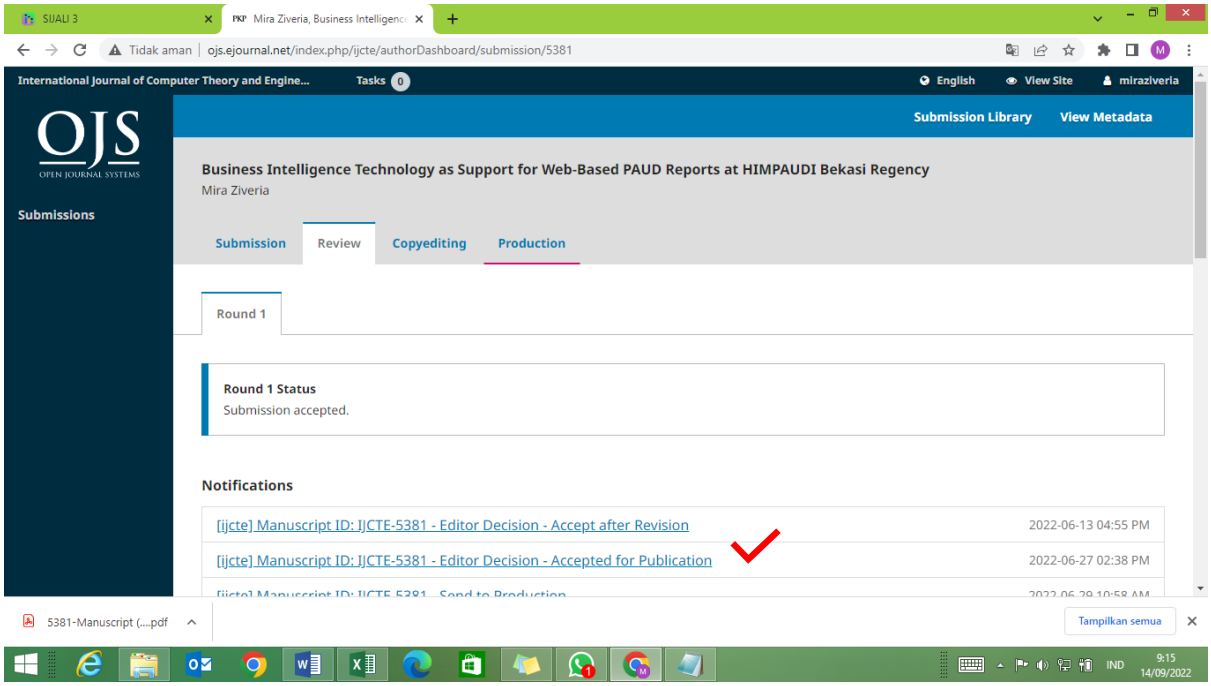

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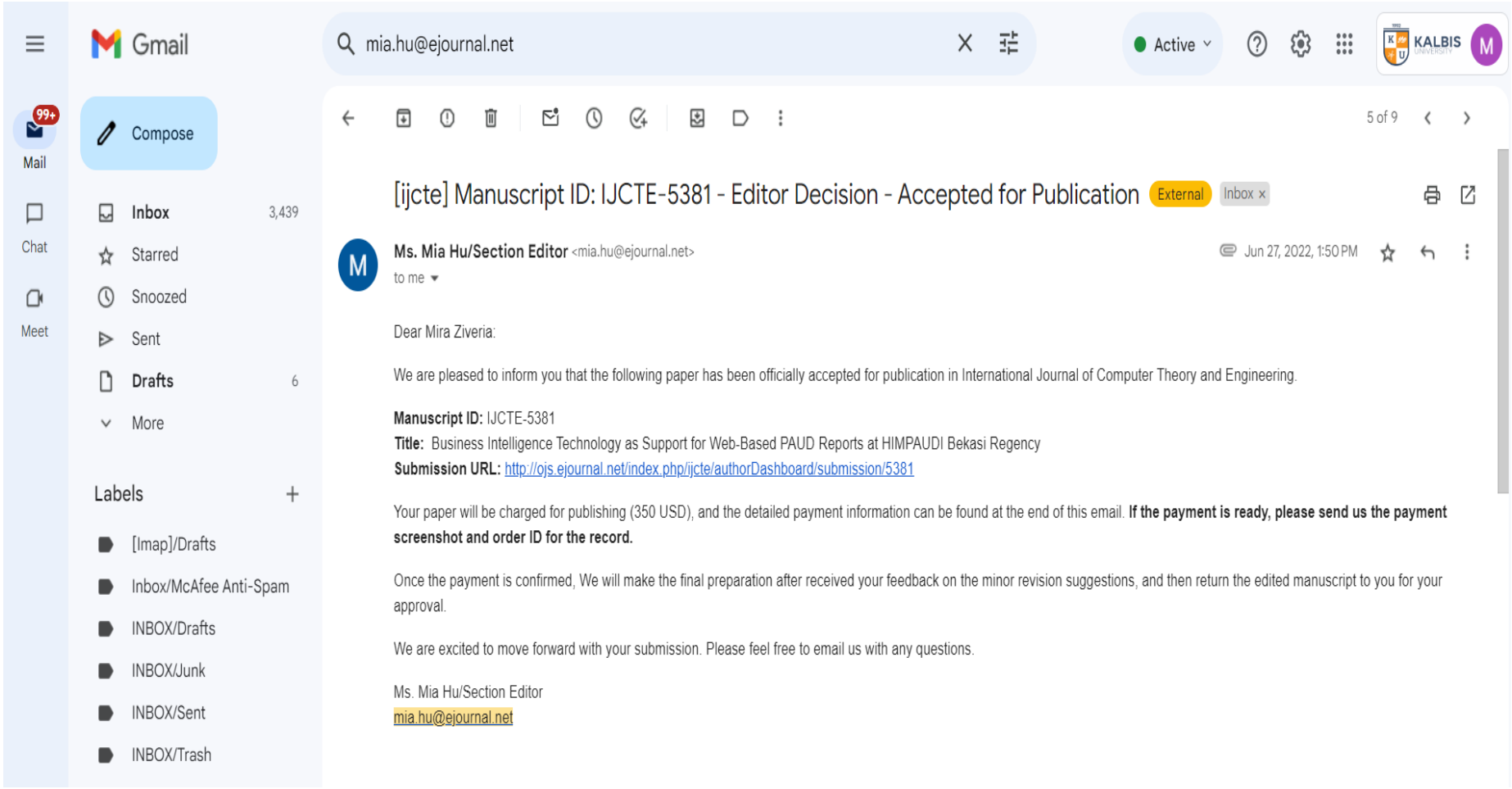
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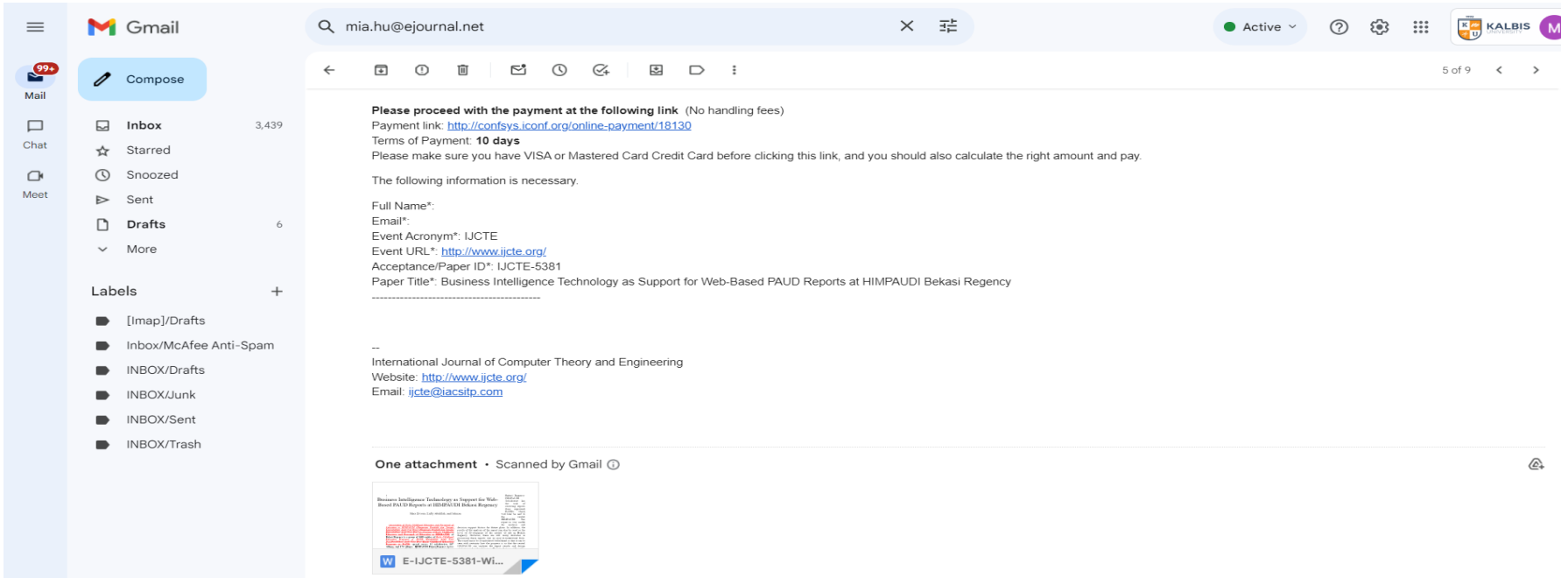
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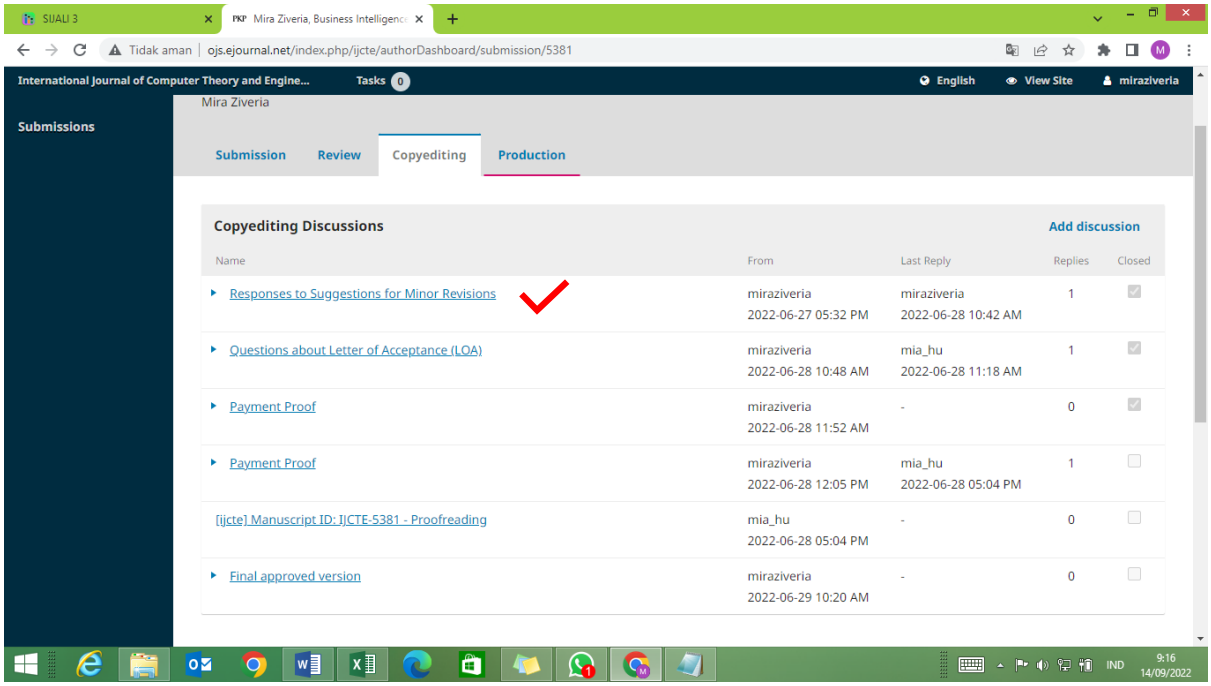

Responses to Suggestions for Minor Revisions

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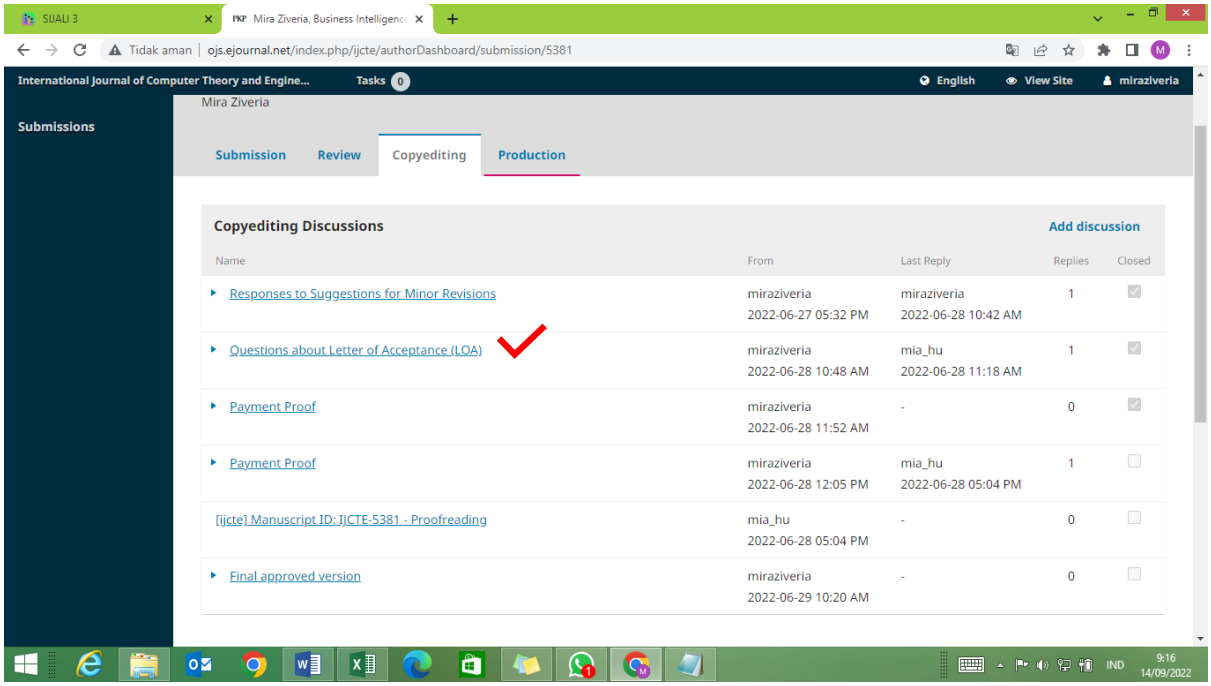

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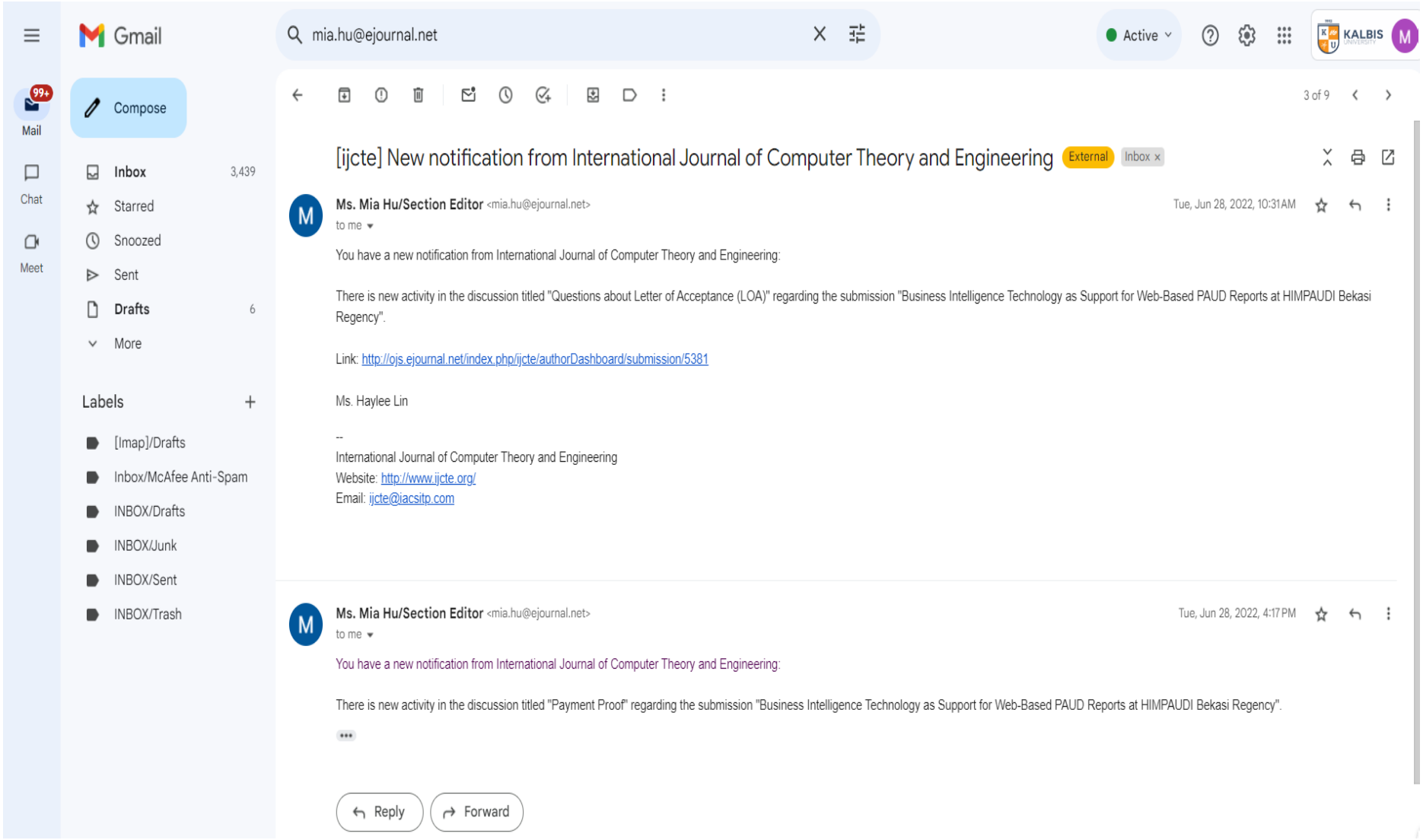
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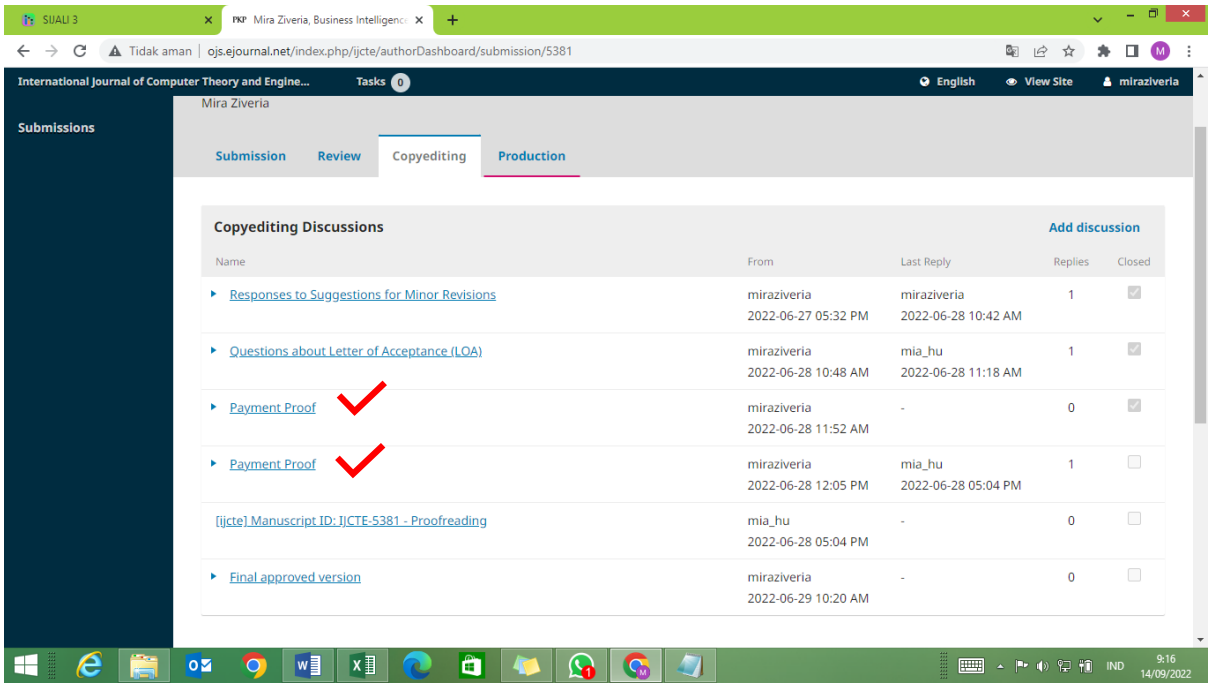

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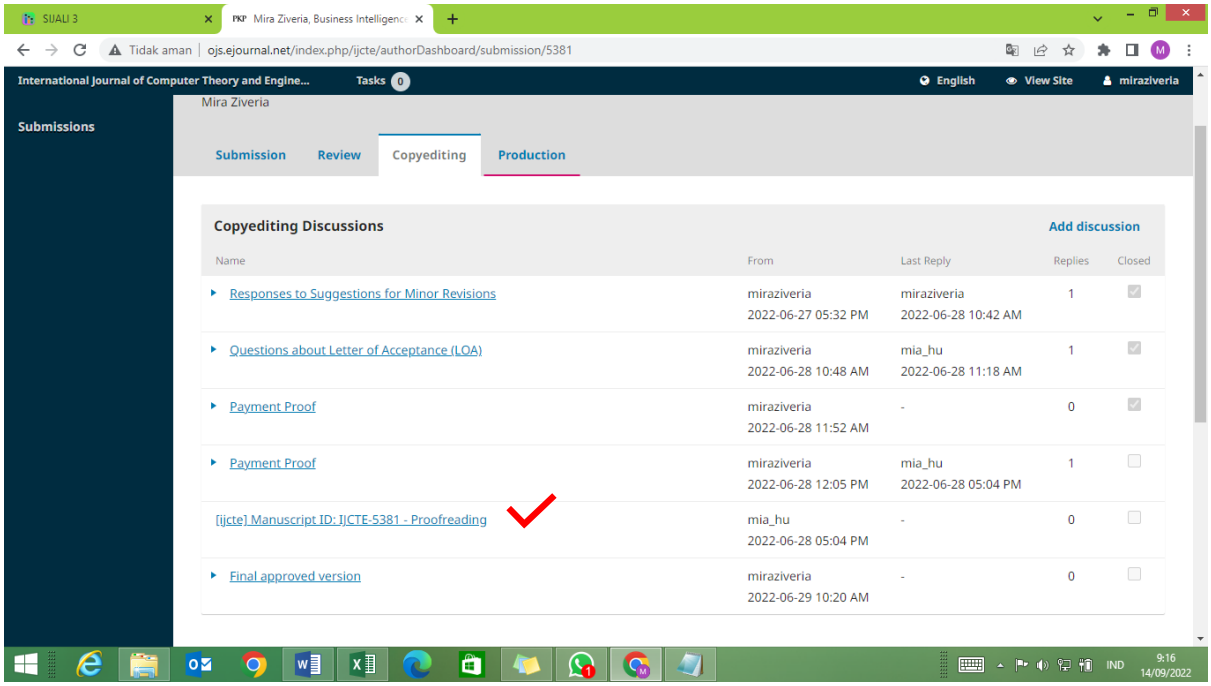

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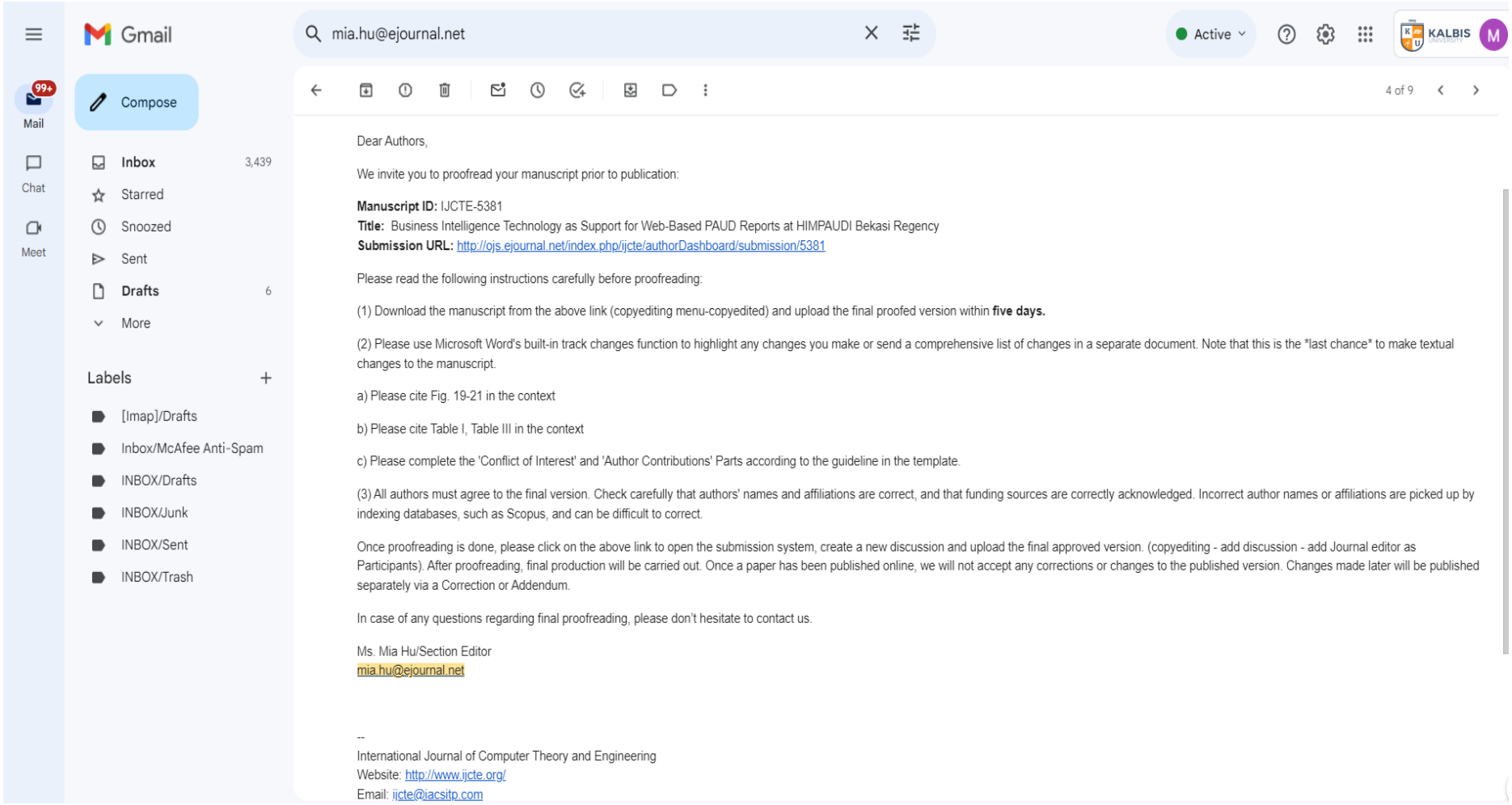
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Business Intelligence Technology as Support for Web-Based PAUD Reports at HIMPAUDI Bekasi Regency

Mira Ziveria, Lufty Abdillah, and Salman

***Abstract*—Association of Early Childhood Educators and Personnel of Education or HIMPAUDI (Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini))** of Bekasi Regency is a group of 1680 entities of *Early Childhood Education Programs or PAUD (Pendidikan Anak Usia Dini)* spread across 23 sub-districts, 187 villages, and 176 villages. HIMPAUDI Bekasi Regency strives to realize the application of computer technology to evaluate routine reports from PAUD educational institutions every month. At this time there are still many obstacles in processing reports into a form that is easy to understand. This study aims to build a computer-based system in reporting activities at HIMPAUDI Bekasi Regency which is useful for making it easier for each PAUD to send reports to the Regency HIMPAUDI, making it easier for District HIMPAUDI to monitor and recap all reports, and facilitate the analysis of HIMPAUDI reports for Bekasi Regency. The report system built is a web-based system that uses Business Intelligence technology to analyze reports so that reports uploaded in the form of excel files can be automatically recapitulated by the system into graphs that can be viewed based on parameters such as year, age, study group, and so on. The website development method uses the System Development Life Cycle (SDLC) which starts with data collection, system analysis and design, implementation, testing and system maintenance. The result of the research is a web-based Business Intelligence application to support PAUD reports in Himpaudi Bekasi Regency which are submitted and then managed by Himpaudi of Bekasi Regency.

***Index Terms*—Business Intelligence, reports, SDLC, web.**

I. Introduction

In this section, the researcher explains the background, problem formulation, objectives, and benefits of this research.

A. Background

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. The HIMPAUDI Secretariat of Bekasi Regency is located at Jalan MT.Haryono No.26, Taman Rahayu Village, Setu District, Bekasi Regency, West Java Province. The number of PAUD in Bekasi Regency is 1,680 PAUD consisting of 976 TK/RA (kindergarten/raudhatul ethical), 574 KB (playgroup), 14 TPA (child care), and 116 SPS (similar PAUD unit) [1].

HIMPAUDI of Bekasi Regency consists of several sub-districts of HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. Reports that are still written manually using paper are sometimes difficult to follow and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports neatly and attractively, as well as practical and effective in obtaining the results of the analysis of these reports.

HIMPAUDI of Bekasi Regency strives to realize the application of computer technology to recapitulate routine reports from PAUD educational institutions every month. It takes a system that can accommodate these reports practically and efficiently in obtaining the results of report analysis and reports can be presented in a neat and attractive manner. Reports that are routinely sent every month include student, teacher, and personel data. Student data sent includes identity, class, last month's student condition, current month's student condition, attendance, PAUD facilities and infrastructure, and others. Teacher and personnel data includes identities such as last education, status, decree, years of service, attendance, and others.

Reports that are still written manually using paper are sometimes difficult and take a long time to recapitulate, especially for all PAUD reports in all sub-districts in Bekasi Regency, which number in the hundreds each month. In addition, the constraint on the storage space for the PAUD report file every month sometimes causes problems. The recapitulation process which is often late causes the reports that have not been processed yet to be piled up and sometimes forgotten, even many reports are damaged and take up a lot of storage space. For this reason, a system is needed that can accommodate these reports neatly and attractively, as well as practical and effective in obtaining the results of the analysis of these reports.

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The problem in the research is how to build an application that applies Business Intelligence technology to support web-based PAUD reports at HIMPAUDI of Bekasi Regency so that it can make it easier for every PAUD to send reports to HIMPAUDI, HIMPAUDI is easy to monitor, recapitulate, and reports uploaded in excel files can be recapitulated automatically. automatically by the system into a graphical form that can be viewed based on the desired parameters.

Researchers under the auspices of the Institut Teknologi dan Bisnis Kalbis have collaborated with HIMPAUDI of Bekasi Regency since 2016 for research activities and community service. Based on observations and analysis results, researchers can identify the needs of partners, one of which is a problem in reporting data from PAUD throughout Bekasi Regency, which number in the thousands to HIMPAUDI Regency every month. In 2019 researchers conducted research on PAUD data reporting at HIMPAUDI of Bekasi Regency by building a website whose one function was to support data reporting, but the resulting system did not help much because the report was not analyzed by the system, making it difficult to understand.

Based on this, in this research proposal, the researcher tries to use Business Intelligence technology so that PAUD reports uploaded in excel files can be recapitulated automatically by the system into a graphic form that can be viewed based on the desired parameters such as year, age, study group, and so on.

B. Formulation of the Problem

The formulation of the problem in this research is to use business intelligence technology to support web-based PAUD reports in HIMPAUDI, Bekasi Regency.

C. Limitation of the Problem

Limitations of the problem in this research are:

1) The research was conducted in HIMPAUDI of Bekasi Regency, therefore the system design was adapted to the current condition of Himpaudi.
2) Development of a website as a means of conveying HIMPAUDI information including profiles, agendas, news, data, and the Himpaudi secretariat.
3) Development of a website as a means for reporting PAUD to HIMPAUDI covering data on students, educators and education staff, as well as facilities and infrastructure.

D. Purposes of Research

The purpose of this research is to produce a web-based system for HIMPAUDI of Bekasi Regency which is managed by HIMPAUDI of Bekasi Regency administrators to be used by PAUD to provide reports to HIMPAUDI, can be monitored by HIMPAUDI of Bekasi Regency and can be recapitulated automatically by the system into a graphic form that can be viewed based on parameters by applying Business Intelligence technology with the System Development Life Cycle (SDLC) method and using the PHP programming language and MySQL database as well as XAMPP and Tableau software.

E. Benefits of Research

The development of the Bekasi Regency HIMPAUDI website can provide the following benefits:

1) For HIMPAUDI of Bekasi Regency, among others: (a) HIMPAUDI management can publish information related to their agencies through the website, (b) HIMPAUDI management can monitor and obtain PAUD reports, and can automatically recapitulate through the system into a graphic form that can be viewed based on several parameters, (c) PAUD administrators at the sub-district level can easily report to district-level administrators through the system.
2) For the community, among others: (a) Get information quickly and easily about HIMPAUDI of Bekasi Regency, (b) Educate the public to be able to find information about HIMPAUDI through the website.

II. Literature Review

In this section, the researcher explains the theory, perspective, literature review, and previous research related to the topic of this research.

A. HIMPAUDI

HIMPAUDI is an independent organization that brings together elements of early childhood educators and education personnel. Association of Early Childhood Educators and Personnel of Education or abbreviated HIMPAUDI (*Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini*) is a professional organization that houses non-formal PAUD educators and education personnel. HIMPAUDI has the duty and role to facilitate PAUD educators in developing all their potential, especially in terms of developing their competence as PAUD educators so that they are able to provide educational services for early childhood optimally in accordance with what is stated in HIMPAUDI's vision, namely realizing educators and education personnel for young children. strong, professional, and noble character [2].

B. Basic Concepts of Information Systems

The system is a network of interconnected procedures and procedures that gather together to carry out an activity or complete a certain target [3].

The system is the elements that are interrelated and work together to process the input or input addressed to the system and process the input to produce the desired output or output. The elements contained in the system include: [4]

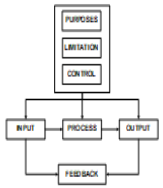


Fig. 1. Element of system.

Based on the theory that has been put forward, researchers can conclude that the system is an element that is interconnected to achieve a certain goal. From Fig. 1 above, it can be explained that the objectives, limitations, and control of the system will affect the process input and output. Inputs that enter the system will be processed and processed to produce output. The output will be analyzed and will become feedback for the recipient and from this feedback will emerge all kinds of considerations for further input. Furthermore, this cycle will continue and develop according to the existing problems.

Data that is processed through a model becomes information, the recipient of the information then receives the information, makes a decision and takes action, resulting in another action that makes some data back. The data is inputted, reprocessed through a model, and so on to form a cycle. This cycle by John Burch is called the information cycle [3].

Information is a collection of data or facts that are organized in a certain way so that they have meaning for the recipient. The quality of information depends on three things, namely the information must be accurate, timely, and relevant. An information system is a system within an organization that brings together the daily transaction processing needs that support managerial organizational operations functions with strategic activities of an organization in order to be able to provide certain outside parties with the necessary reports. Information system components include input, model, output, technology, database, and control [5].

C. Web-Based Information System

A web-based information system is an information system that uses web or internet technology to support and facilitate human work to become more efficient. Because a web-based information system uses the help of the internet or web-based applications, it means that there are things that must be met to create this web-based information system such as HTML, CSS, Javascript web programming languages, the use of web servers, for example, the Apache web server and also a data storage warehouse or database. which you can create using Oracle or MySQL. The requirements for the formation of a website are: [6]

1) Availability of Web Server, either static or dynamic web. If you want to be online on the internet, the first requirement must be to have a server, both hardware and software. Hardware is a set of computers that are always connected online to the internet. For software, apart from the operating system, software for the web server itself must also be provided. For now, the favorite web server is Apache.
2) Availability of Server-Based Web Programming Software. If you want to create a web, it means that a web programming language other than HTML must be available, both client-side and server side. For the client-side, it has a drawback that the program instructions can be seen by internet users. While the server-side is more secure because the program instructions are not visible to the user, what is visible is like ordinary HTML. An example of a favorite web programming language is PHP.
3) Availability of Databases. Database is software used to store and manage data. If you have a little data, maybe you can still use ordinary files as storage media. But if the data is already very much, without a database it will be very complicated. Databases can store millions of data and can be accessed very quickly. Examples of databases that can be used to create a web are Oracle, MySQL, and many others. The database that will be used by the author is MySQL.

D. Business Intelligence (BI)

BI is a collection of techniques and tools for transforming raw data into useful and meaningful information for business analysis purposes. BI technology can handle huge amounts of unstructured data to help identify, develop, and otherwise create new business strategic opportunities. The purpose of BI is to facilitate the interpretation of this large amount of data. Identifying new opportunities and implementing an effective strategy based on insights can provide a business with a competitive market advantage and long-term stability.

BI is the process of using the power of people and technology to collect and analyze data for use by organizations in strategic and day-to-day decision-making processes. Thus, the process involved involves collecting data into a data warehouse or other data warehouses. Next, the company will use special tools to analyze the data. The essence of BI is the process of taking raw data that most people cannot understand, and then processing it by converting raw data into understandable information so that data users can carry out their work properly.

The main goal of BI is to drive better and quality business decisions. In this way, the company can increase its revenue, improve business operational efficiency, and gain a competitive advantage in the midst of market competition. And to achieve this goal, BI uses a series of analyzes that are combined according to the purpose and needs of their use, data management tools and data reporting, along with various methodologies for managing and analyzing data.

In a BI architecture, we can not only find BI software. BI data is generally stored in data warehouses created for the entire company, as well as in smaller spaces that contain pieces of business information, for example for each division or business unit. However, all of these parts are related to the data warehouse of the company as a whole.

BI data can be in the form of historical information or real-time data, all of which is gathered from the source system as it is generated. Therefore, tools in BI can support strategic and tactical (daily) decision-making processes. The raw data collected from various source systems need to be integrated first, as well as combined and cleaned using data integration tools and data quality management tools. Its purpose is to ensure that its users obtain accurate and consistent information in the business analysis process. [7]

The BI process involves the following steps:

1) Integration of data from source systems into a data warehouse or other data warehouse.
2) Preparation of data into analytical data models for analysis requirements.
3) Application of analytical queries to data by BI analysts and professional business analysts.
4) Creating data visualizations, dashboards, reports, and so on using query results.
5) Use of information for corporate strategic planning and decision making.

E. Decision Support Systems

Decision Support System (DSS) is defined as a computer-based system consisting of interacting components, namely language systems, knowledge systems, and problem processing systems. DSS is not a decision-making tool, but a system that helps decision-makers by equipping them with information from data that has been processed relevantly and needed to make decisions about a problem more quickly and accurately. DSS is intended to help decision-makers to solve semi- and or unstructured problems with a focus on presenting information that can later be used as the best alternative decision-making material. [8]

The Decision Support System consists of 3 main components, namely:

1) Database, is a component of a decision support system providing data for the system. The data is stored in a database organized by a system called the Database Management system/DBMS.
2) Model
3) Dialog (User System Interface)

F. Dashboard System

The dashboard is an application that serves to display performance-related information for company managers. The dashboard concept has been around for years and has been adopted by many companies around the world. Dashboard is a visual representation containing important information needed to achieve goals and can be arranged on one screen so that it will be easier for users to monitor it. Meanwhile, the information dashboard is a visual display containing important information needed to achieve goals by organizing information on one screen so that organizational performance can be monitored [9].

There are three types of dashboards, namely:

1) Strategic dashboard

Strategic dashboards are useful to support strategic level management in obtaining information to make business decisions, predict opportunities, and provide direction in achieving strategic goals.

2) Tactical dashboard

Tactical dashboards focus on the analysis process to determine the cause of a particular condition. This dashboard serves to measure short-term productivity and effectiveness whose results are often used by individual contributors.

3) Operational dashboard

Operational dashboards are useful to support the monitoring of specific business process activities in their daily life. This dashboard measures the short-term effectiveness of specific business functions at the team or business unit level.

G. Tableau

Tableau is a tool that can facilitate the creation of interactive visual analysis in the form of a dashboard. Another definition of Tableau is that Tableau is software that supports collaborative data visualization for someone who works in analyzing business information. From the two definitions above, it can be concluded that Tableau is software that can process data into an attractive visual. That way, the data set will be easier to understand. Tableau has various advantages that can be taken into account when visualizing data in the form of graphs or dashboards. Some of Tableau's advantages include interactive visual options, user-friendly, processing multiple data sources, mobile-friendly dashboard, and integration with scripting languages. Tableau combines SQL in the database with a descriptive language to create graphs and creates a database visualization language called VizQL. The version used by the researcher is Tableu Public which is free and can be used by anyone. [10]

H. Reports

One of the important points in this research is how to process and integrate a report. The following is the definition of a report according to several experts: A report is a form of presenting facts about a situation or activity. The facts presented relate to the responsibilities assigned to the reporter [3].

According to Rakesh TK, "Reporting Solution is to deliver and implement a consistent, personalized information delivery system that includes performance data (key performance indicators) which are relevant, accurate and transparent for use by regional management and executives to enable decision making each month. [5]

Can be interpreted as, a report is a collection of data in which it is formed based on relevant, accurate and transparent KPIs (key performance indicators) to be used by management or executives in making decisions on a monthly basis. Report types can be grouped based on a certain time, namely Regular/Periodic Reports, Special/Exception Reports, Unscheduled Reports, Special Analysis Reports, Process Inquiry Reports [11].

I. System Development Life Cycle (SDLC)

SDLC is a pattern taken to develop a software system, which consists of the following stages: system planning (planning), analysis (analysis), design (design), implementation (implementation), testing (testing) and management (maintenance). In software engineering, the concept of SDLC underlies many types of software development methodologies. SDLC stages are as follows [12]:

1) System planning system (planning), more emphasis on aspects of the feasibility study of system development (feasibility study).
2) System Analysis (analysis). The project objectives refine into defined functions and operations of the intended application. Analyze the end-user required information.
3) System Design (design). Describes the desired features and operations in detail, including screen layouts, business rules, process diagrams, pseudo and other documentation.
4) System Implementation (implementation). Implement the design from the previous stages and conduct trials.
5) System testing (testing), namely testing the system that has been made.
6) System Management (maintenance). It is carried out by the appointed admin to keep the system able to operate properly through the system's ability to adapt itself according to needs.

J. Data Flow Diagram (DFD)

DFD is a diagram that uses notation to describe the flow of data in a system, whose use is very helpful for understanding the system logically, structured, and clear. DFD can also be used as a tool in describing or explaining the work process of a system. DFD is a system design tool that is oriented to the flow of data with a decomposition concept that can be used for describing analysis and system design that is easily communicated by system professionals to users and program makers. There are 3 levels of DFD, namely Context Diagram, Zero Diagram (Level 1 Diagram), and Detailed Diagram [4].

TABLE I: DATA FLOW DIAGRAM NOTATION

SYMBOL	REMARKS
	*External Entity* is a unit (entity) in the system environment which can be in the form of people, organizations or other systems in the external environment that will provide input or output from the system.
	*Data Flow* shows the flow of data which can be input to the system or the results of system processes
	*Process* are activities or work carried out by people, machines or computers from the results of a data flow that enters the process to produce data flows that will come out of the process.
	*Data Store* is from data that can be in the form of a database on a computer system, an archive, manual notes, an agenda, or a book.

K. Entity Relationship Diagram (ERD)

In the ERD model, the universe of data that exists in the real world is translated by utilizing a number of conceptual tools into a data diagram, which is generally referred to as an Entity-Relationship Diagram (E-R Diagram). The Entity-Relationship model is formed from two components, namely entities (entities) and relationships (relation). These two components are further described through a number of attributes. ERD was first described by Peter Chen which was created as part of the CASE software. The notations used in ERD are entities, relationships, attributes and lines [12].

L. User Acceptance Test (UAT)

UAT is a testing process carried out by the user with the output of a test result document that can be used as evidence that the software has been accepted and has met the requested requirements. The UAT is not much different from the questionnaire in the early stages of making the application.

UAT is a verification process that the solution created in the system is suitable for the user. This process is different from testing the system (making sure the software doesn't crash and conforms to the user's request documents), but rather making sure that the solution in the system will work for the user, testing that the user accepts the solution in the system. UAT is generally performed by the client or end user, usually focusing not on the identification of simple problems such as spelling errors, nor on showstopper defects, such as software crashes. Testers and developers identify and fix these problems during the early stages of functionality testing, during integration testing and at the system testing stage [6].

M. Previous Research

In this sub-chapter, previous research that is relevant to the research conducted by the researcher will be discussed. The results of the researcher's observations regarding "Development of the Bekasi Regency Himpaudi Website as Support for PAUD Reporting" have never been carried out, but there are several similar topics that have been carried out, including the following:

1) "Aplikasi *Intelligence Website untuk Penunjang Laporan PAUD pada HIMPAUDI Kota Tangerang*" by Dina Fitria Murad, Nia Kusniawati, and Agus Asyanto from STMIK Raharja that published in the CCIT Journal Vol.7 No.1 September 2013 [13].
2) "Web Information Monitoring for Competitive Intelligence" by Bing Tan, Schubert Foo, and Siu Cheung Hui from School of Computer Engineering, Nanyang Technologycal University, Nanyang Avenue, Singapore that published in the International Journal Cybernetics and System Vol.33, November 2010 [14].
3) "Perancangan Sistem Penyajian Laporan Realisasi Anggaran pada Badan Pusat Statistik Kota Tangerang" by Sudi Hartati from STMIK Raharja in 2009 [15].

III. Research Metodology

The method of collecting data in this study was to conduct interviews with several PAUD and HIMPAUDI administrators in Bekasi Regency and make direct observations to see the implementation of reporting and also how HIMPAUDI disseminates information to PAUD and the community regarding the profile and activities carried out by HIMPAUDI or PAUD. Observations were made on August 1 and 17 2018 and took place at PAUD Pelita Rahayu, Setu District, which is the Secretariat of HIMPAUDI, Bekasi Regency and SPS Bhakti Pertiwi, Tambun Selatan District, Bekasi Regency.

Based on interviews and observations made by researchers, researchers obtained information about the general description of HIMPAUDI of Bekasi Regency. The general description of HIMPAUDI contains a profile that includes the vision and mission, activities, management, organizational structure, as well as examples of reports that must be made and sent from PAUD to HIMPAUDI Regency which is carried out every month.

The website system development method in this study uses the System Development Life Cycle (SDLC) method starting from planning, analysis, design, implementation, testing and maintenance (Fig. 2).

Fig. 2. Stages of system development life cycle.

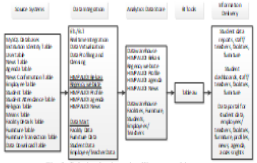


Fig. 3. Solution business intelligence architecture.

Details of activities for each SDLC stage carried out in the study can be seen in Table II.

TABLE II: STAGES OF RESEARCH

Stages of Research	[illegible]
System Planning	• PAUD and HIMPAUDI • Scope of HIMPAUDI of Bekasi Regency • Vision, Mission and Goals HIMPAUDI of Bekasi Regency • Organizational Structure of HIMPAUDI of Bekasi Regency • Secretariat of HIMPAUDI of Bekasi Regency
System Analysis	• Data Reporting from PAUD Village /Ward to HIMPAUDI of Bekasi Regency • Recapitulation of PAUD reports to HIMPAUDI of Bekasi Regency • Information Dissemination from HIMPAUDI Bekasi Regency to the Village/Ward Level • Weaknesses of the Running System • Feasibility study • System Functional Requirements Analysis • Analysis of Non-Functional System Requirements
System Design	• Context Diagram • Data Flow Diagrams (DFD) Level 1 and 2 • Database Design (Entity Relationship Diagram and Physical Data Model, Table Structure) • Interface Design • Hardware and Software Design
System Implementation	• Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, jQuery 3.2.1 with notepad++ editor • Implementation of Data Visualization with Tableau • Database Implementation with MySQL
System Testing	• Testing using free Web Hosting with black box testing
System Management	• Rent Web Hosting and Domain • Upload to Web Hosting • System Usage Guide • Submission of the website to HIMPAUDI Bekasi Regency

This research activity was conducted at Institut Teknologi dan Bisnis Kalbis, Jalan Pulomas Selatan Kav.22, East Jakarta. This research was conducted for one year, starting from October 2020 to September 2021.

Solution business intelligence architecture for the system can be seen in the Fig. 3.

IV. Result and Discussion

HIMPAUDI of Bekasi Regency is an institution that oversees PAUD educational institutions in Bekasi Regency. HIMPAUDI of Bekasi Regency consists of several sub-district HIMPAUDI who work in each sub-district in Bekasi Regency. HIMPAUDI Sub-district has the task of receiving reports from registered PAUDs which will later be sent to the central HIMPAUDI. An overview of the scope of HIMPAUDI in Bekasi Regency which oversees PAUDs in Village / Ward in Bekasi Regency can be seen in Fig. 4.

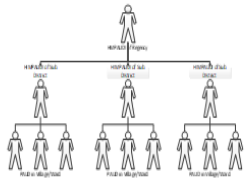


Fig. 4. Scope of HIMPAUDI of Bekasi Regency.

The report is very useful for analysis and decision support factors for future plans. In addition, the results of the analysis of the report can also be used as the level of development of the quality of life in Bekasi Regency. However, there are still many obstacles in processing these reports into an easy-to-understand form. The report must be recapitulated beforehand so that it can be seen with certainty how the progress is so that the central HIMPAUDI can analyze the report results and design strategies and make decisions. The types of reports that are routinely sent from each PAUD to the sub-district level and continued to the district level are reporting:

1) Report of Student Data
2) Report of Educator and Personnel of Education.

The process of reporting PAUD from Village/Ward to HIMPAUDI Center (HIMPAUDI of Bekasi Regency) can be seen in Fig. 5.

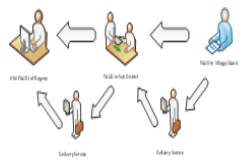


Fig. 5. Report of PAUD to HIMPAUDI of Bekasi Regency.

Fig. 6. Report of student data from PAUD in village/ward to HIMPAUDI in sub-district.

An example of a student data reporting form from PAUD at the village/ward level to the sub-district level can be seen in Fig. 6 and an example of reporting data on educators and education personnel from PAUD at the village/ward level to the sub-district level and from the sub-district to the district level can be seen in Fig. 7.

Fig. 7. Report of educator and personnel of education in sub- district to district level.

Dissemination of information such as news, agenda, and data from HIMPAUDI Bekasi Regency to the Village/Ward Level or to the wider community is carried out in several ways and the media. The method is carried out such as holding a meeting or meeting by inviting the chairperson, operators, educators and education staff to the District HIMPAUDI Secretariat. The media used are sending letters, brochures, banners, email, telephone, WhatsApp messages, and others.

Fig. 8. Dissemination of Information HIMPAUDI of Bekasi Regency.

In terms of disseminating information such as news, agendas, and data from HIMPAUDI of Bekasi Regency to the Village/Ward Level or to the wider community using media such as sending letters, brochures, banners, emails, telephones, WhatsApp messages on the current system, the weaknesses are:

1) If using email, the HIMPAUDI operator at the Regency level must send it to all email addresses of all operators or leaders. This requires precision and a long time.
2) If you use a letter, it will take a long time to arrive at the Village/Ward level and also requires a mail delivery fee.
3) If using a banner, the range of information conveyed is limited only to people who see the banner. So with banners it is difficult to reach all PAUD in Bekasi Regency.
4) If you use a phone and WhatsApp message, it will take a long time because you have to call all PAUD in Bekasi Regency.
5) Does not have an effective and efficient forum to convey information about profiles, agendas, news, and data from HIMPAUDI of Bekasi Regency to PAUD under it and the general public.

In terms of reporting data on students, educators, and education staff from PAUD at the Village/Ward level to the sub-district level and continued to the district level using an excel file that is printed and sent to the current system, the weaknesses are:

1) It takes a long time for the process of sending reports from PAUD at the Village/Ward level to arrive at HIMPAUDI District.
2) It takes a long time to process data recording at the sub-district level because it must accumulate all data from the village/ward level PAUD.
3) The accuracy of reporting data and data recapitulation at the sub-district level is not guaranteed because they have to manually recap reports from PAUD-PAUD at the Village/Ward level.
4) Does not have an effective and efficient forum for reporting data on students, educators, and education staff from PAUD at the Village/Ward level to HIMPAUDI, Bekasi Regency.

Based on observations made by researchers in the field, it can be seen that this research has never existed in the HIMPAUDI environment of Bekasi Regency. Based on the results of interviews conducted by researchers with the Head of HIMPAUDI of Bekasi Regency, Secretary Himpaudi Bekasi Regency, and several PAUD chairpersons and operators in Bekasi Regency, research to build the Bekasi Regency HIMPAUDI website using business intelligence technology to support PAUD reporting has never been carried out and is very feasible for realized because the system that the researcher will do is one solution to increase the speed and accuracy of delivering information from HIMPAUDI Regency to the Village/Ward level and also for reporting data from PAUD Village/Ward to HIMPAUDI Regency to be more effective and efficient.

Functional requirements are requirements that must be met so that a system can run as expected. The functional requirements that must exist on the Bekasi Regency Himpaudi website to be developed are described in Table IV.

TABLE III: SYSTEM FUNCTIONAL REQUIREMENTS

User	Functional Requirements
HIMPAUDI Regency	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as HIMPAUDI Regency operator • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of graphs, namely dashboards for personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can receive and monitor recap reports from sub-district and sub-district early childhood education in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from sub-district and sub-district early childhood in pdf format • Can manage news to be published to sub-district, sub-district/village early childhood • Can manage agendas that will be published to sub-district, ward/village early childhood education • Can manage user access rights for village/ward, sub-district, and district levels
HIMPAUDI Sub- District	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and information on the Bekasi Regency HIMPAUDI secretariat • Can log in and log out as a sub-district HIMPAUDI operator • Can receive and monitor recap reports from sub-district early childhood education in graphic form, namely dashboard of personeel attendance, student attendance, furniture, and facilities based on required parameters • Can receive and monitor the recap of reports from the PAUD of Village/Ward in the form of tables, namely tables of personeel attendance, student attendance, furniture, and facilities based on the required parameters • Can save the report recap table file from the PAUD of Village/Ward in pdf format
	• Can provide news proposals to district preschools for publication • Can receive information published by district preschools, including profiles, agendas, news, and downloadable data
HIMPAUDI Ward/Village	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency • Can log in and log out as a sub-district/village HIMPAUDI operator • Can send reports to sub-districts and districts in the form of student attendance data, personeel attendance, furniture and facilities data • Can provide news proposals to district preschools for publication
General Public	• Can receive information published by district early childhood education, including Profile, Agenda, News, download general data, and secretariat information of HIMPAUDI of Bekasi Regency

Non-functional requirements include hardware requirements and software requirements. The hardware that will be used is utilizing the hardware already owned by HIMPAUDI operators and the community. HIMPAUDI operators include operators at the institutional, sub-district, and district levels. The number and specifications of the hardware owned already support the operation of the designed system. While using manual reporting using an excel file, the operator is already using a computer or laptop whose specifications vary.

The hardware that can be used in the system made are: (1) PC, (2) VGA monitor has a minimum resolution of 800 x 1200 pixels, (3) Keyboard and mouse to perform user activities, (4) Internet broadband, (5) All the hardware used is a standard device in a computer system as well as for internet connections.

The software used in this research process as follows: (1) Hardware in the form of a computer set with specifications Processor Intel® CORE™ i5-2450M, CPU @ 2.5 GHz, 4.0 GB RAM, (2) Software in the form of Microsoft Windows 8, Microsoft Office 2010, Notepad++ application as a text editor, MySQL as database software, XAMPP server as a web server, Microsoft Visio software for creating flowcharts, and Star UML Diagram software for designing UML diagrams.

User analysis is intended to find out which users are involved in using the HIMPAUDI website so that the level of user understanding of computers can be known. System users are HIMPAUDI operators and the public. HIMPAUDI operators consist of 3 levels, namely institutional operators (village/ward level), sub-district level operators, and district level operators. The public are all people who want to get information about the profile, agenda, and news about HIMPAUDI.

TABLE IV: SYSTEM USERS

User	Access Rights	Classification
Admin (Operator of HIMPAUDI of Regency)	*Input* *Read* *Update* *Delete*	Have basic computer skills. Can operate Microsoft Windows operating system.
		Can operate internet access devices. Processing agendas, news and data to be uploaded or reported by HIMPAUDI Sub-districts and Institutions.
Operator of HIMPAUDI of Sub District	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Making news proposals, processing data reported by HIMPAUDI Institutions to HIMPAUDI of Regency
Operator of HIMPAUDI Institutions (Village/ Ward)	*Input* *Read* *Update* *Delete*	Have basic computer skills Can operate Microsoft Windows operating system Can operate internet access devices Make data reporting to HIMPAUDI of Regency Making news proposals, processing data reported by HIMPAUDI Institutions
Visitor (HIMPAUDI Operator and public)	*Read*	Can operate internet access devices Get information about the profile, agenda, news, and secretariat of HIMPAUDI

The system design stage is carried out after conducting a system analysis so that the new system can run well and as expected. Good design will be able to overcome problems that have occurred so far and anticipate possible errors in the future. In the system design sub-chapter, context diagrams, data flow diagrams, database design, interface design, and system test designs will be described.

To better explain the system input and output functions of each user involved in the system, a Context Diagram will be described as shown in Fig. 9.

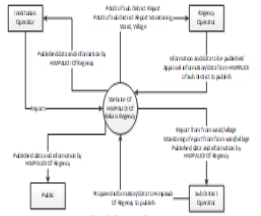


Fig. 9. Context diagram.

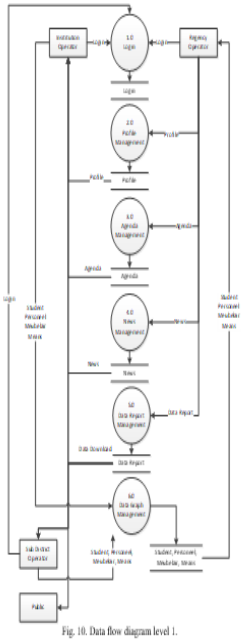


Fig. 10. Data flow diagram level 1.

In the context of the diagram, it is illustrated that the HIMPAUDI of Bekasi Regency website is related to four

external entities, namely the operator at the district operator who is responsible as an admin, the sub-district operator, the operator at the village and village level institutions, as well as website visitors, namely the community. Operators at the HIMPAUDI of Regency get a recap of reports from the system and get data on the results of monitoring reports from HIMPAUDI of Regency, and institutions from the system. Meanwhile, district operators can provide information and data to be published through the system and can give approval to proposed information or data sent from sub-districts and institutions. HIMPAUDI of Sub-District operators can provide information or data suggestions to be published in the system. HIMPAUDI of Sub-District can receive reports from sub-districts/villages, obtain monitoring data from sub-district and HIMPAUDI of Village/Ward reports, and obtain information and data published by HIMPAUDI of Regency. Sub-district and HIMPAUDI of Village/Ward operators can provide reports through the system and can receive information and data published by HIMPAUDI of Regency. The general public can receive information and data published by the HIMPAUDI of Regency.

In Fig. 10 it can be seen that the HIMPAUDI of Bekasi Regency website consists of 6 main processes, namely Login/Logout, Profile Management, Agenda Management, News Management, Data Report Management, Data Graph Management.

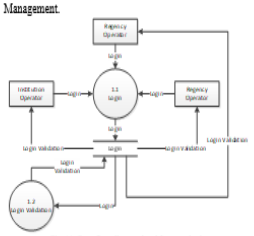


Fig. 11. Data flow diagram level 2 proses login.

In Fig. 11 it can be seen that the Login Process consists of 2 processes, namely the Login Process and the Login Validation Process.

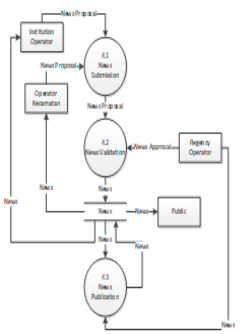


Fig. 12. Data flow diagram level 2 - news management process.

In Fig. 12 it can be seen that the News Management Process consists of 3 processes, namely the News Receipt Process, the News Validation Process, and the News Publication Process.

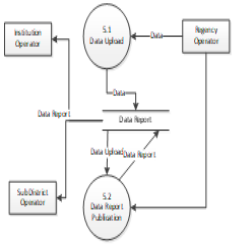


Fig. 13. Data flow diagram level 2 - data report management process.

In Fig. 13 it can be seen that the Data Management Process consists of 2 processes, namely the Data Upload Process and Data Report Publication.

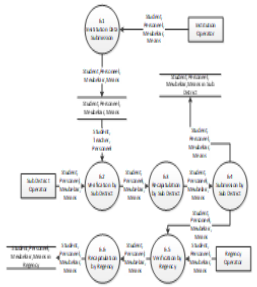


Fig. 14. Data flow diagram level 2 - process data graph.

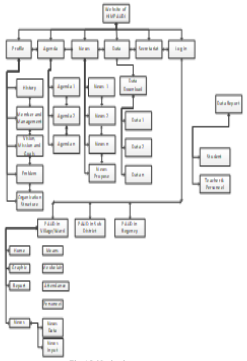


Fig. 15. Navigation structure.

In Fig. 14 it can be seen that the Data Graph Process consists of 6 processes, namely the Institutional Data Submit process, the District Verification process, the District Recap process, the District Submit process, the Regency Verification process, and the Regency Recap process.

Navigation structure is the structure or storyline of a program that is usually used to link web pages based on the elements used in web applications. The navigation structure used in this study is a hierarchical navigation structure. The navigation structure of website visitors is shown in Fig. 15.

In this section, a database design will be made using Entity Relationship Diagrams and table structures described by the Physical Data Model. ERD is made to facilitate analysis and subsequent designs. ERD design is made by displaying the overall relationship between entities and the level of relationships between entities.

ERD describes database design at the conceptual level. Fig. 16 illustrates the connectedness of entities on the HIMPAUDI of Bekasi Regency website.

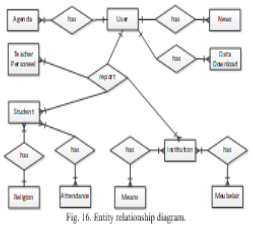


Fig. 16. Entity relationship diagram.

Physical Data Model (PDM) describes database design at the physical level. Fig. 17 illustrates the relationship between tables on the HIMPAUDI of Bekasi Regency website.

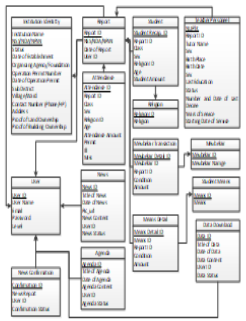
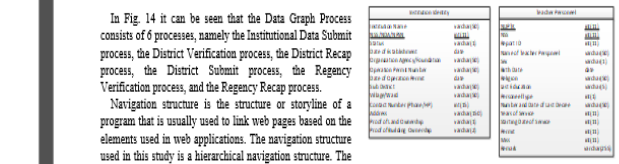


Fig. 17. Physical data model.

The structure of the HIMPAUDI website database table is described in Fig. 18.



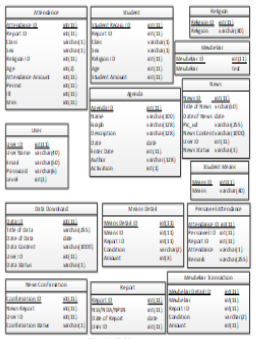


Fig. 18. Table structure.

Interface design or interface design is an important part of designing a system because the interface will relate directly to the user. Therefore, a good interface design and in accordance with aesthetics will make it easier for users to interact with the system to be developed. The design of the HIMPAUDI of Bekasi Regency website interface includes:

Fig. 19. Main page interface design.

Fig. 20. Data reporting page interface design.

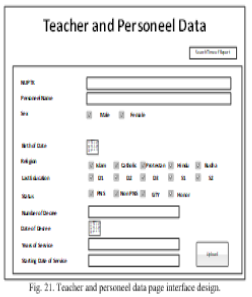


Fig. 21. Teacher and personeel data page interface design.

The HIMPAUDI website testing plan is carried out using black box testing, namely testing the functional system, with input given to the system whether it provides output as expected or not. Testing using localhost with the domain http://localhost/PAUD.

This stage is carried out to create a program by writing scripts using programming languages. Web programming with XAMPP 3.2.2 software, PHP 7.0, HTML 5, CSS 3, Jquery 3.2.1 with notepad++ editor and data storage in MySQL.

Database implementation on phpmyadmin MySQL can be seen in Fig. 22.

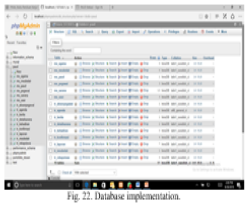


Fig. 22. Database implementation.

Implementation of the HIMPAUDI of Bekasi Regency website interface can be seen in Fig. 23, Fig. 24, Fig. 25, Fig. 26, Fig. 27, Fig. 28, and Fig. 29.

Fig. 23. Main page interface implementation.

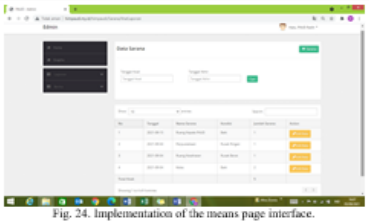


Fig. 24. Implementation of the means page interface.

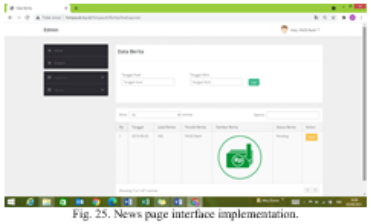


Fig. 25. News page interface implementation.

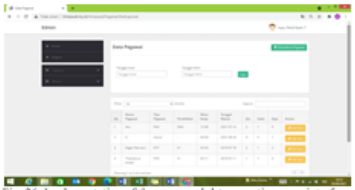


Fig. 26. Implementation of the personeel data reporting page interface.

Fig. 27. Implementation of the personeel data graphics page interface.

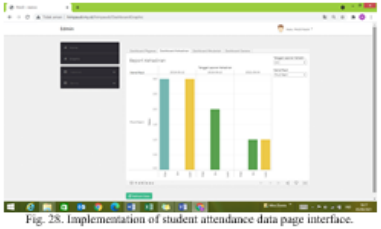


Fig. 28. Implementation of student attendance data page interface.

Fig. 29. Implementation of the furniture data graphics page interface.

The system test results are explained using a system test table that contains information about the Test Class, Input Data, Expected Results, Observation Results and Testing Conclusions.

Based on the results of the tests that have been carried out, it can be concluded that the system is functionally able to produce the expected output. From the results of the tests carried out, it can be concluded that the HIMPAUDI website in Bekasi Regency is in accordance with what is expected. Although there are still many shortcomings, functionally the system created is in accordance with the basic needs of HIMPAUDI.

The last stage of the development of the HIMPAUDI website is system management, namely by uploading web hosting with the domain http://himpaudi.my.id and submitting the website to HIMPAUDI of Bekasi Regency.

V. Conclusion

The conclusions that can be drawn from the research on Website Development of HIMPAUDI of Bekasi Regency as PAUD Reporting Support are as follows:

1) The HIMPAUDI of Bekasi Regency website as PAUD Reporting Support can be developed using the System Development Life Cycle development method.
2) District operators can manage information regarding profiles, agendas, news, secretariat, monitoring data, and reporting data on students, personael, furniture, and facilities from the Institutional and District level through the HIMPAUDI website that was built.
3) Sub-district operators can manage data reporting on students, personael, furniture, and facilities from the Institute and can report the data recap to the District level through the HIMPAUDI website that was built.
4) Institutional operators can manage the reporting of student data, personael, furniture, and facilities from the institution to be reported to the District and Regency levels through the HIMPAUDI website that was built.
5) All PAUD institutions in Bekasi Regency and the public can seek information about profiles, agendas, news, secretariats through the HIMPAUDI website that was built.

Conflict of Interest

Please declare whether or not the submitted work was carried out with a conflict of interest. If yes, please state any personal, professional or financial relationships that could potentially be construed as a conflict of interest. If no, please add "The authors declare no conflict of interest".

Author Contributions

Please state each author's contribution to this work, it can be up to several sentences long and should briefly describe the tasks of individual authors. e.g., AB conducted the research; CD analyzed the data; AB wrote the paper; ...; all authors had approved the final version.

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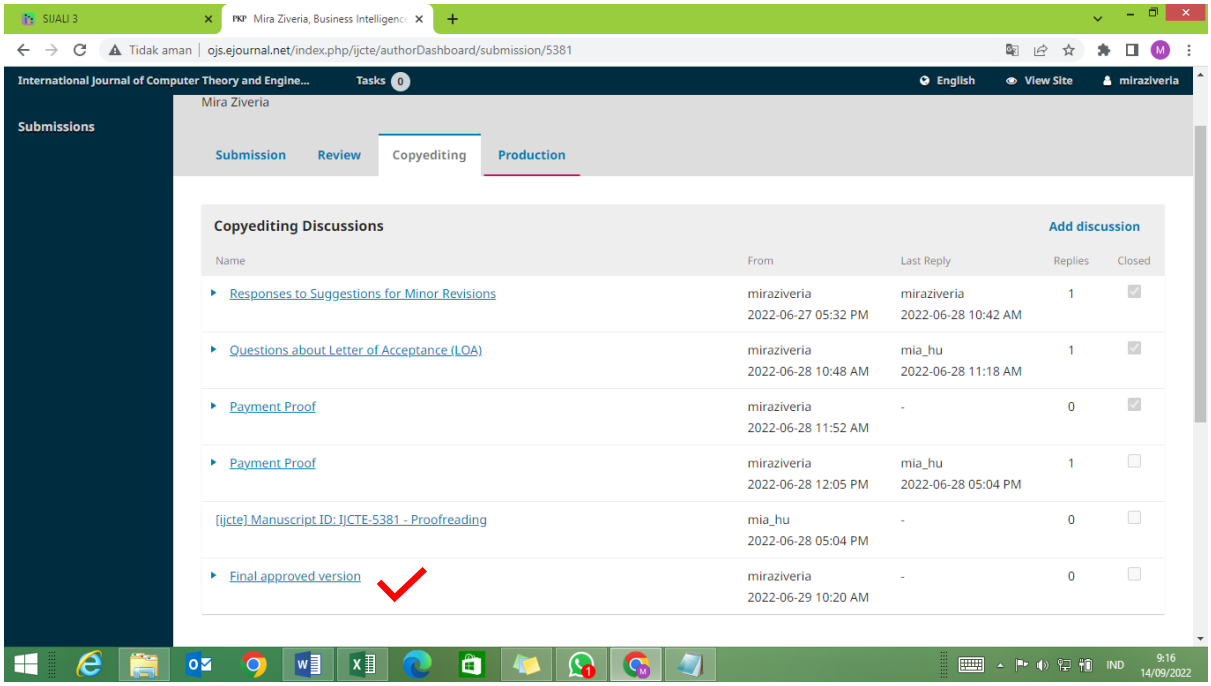

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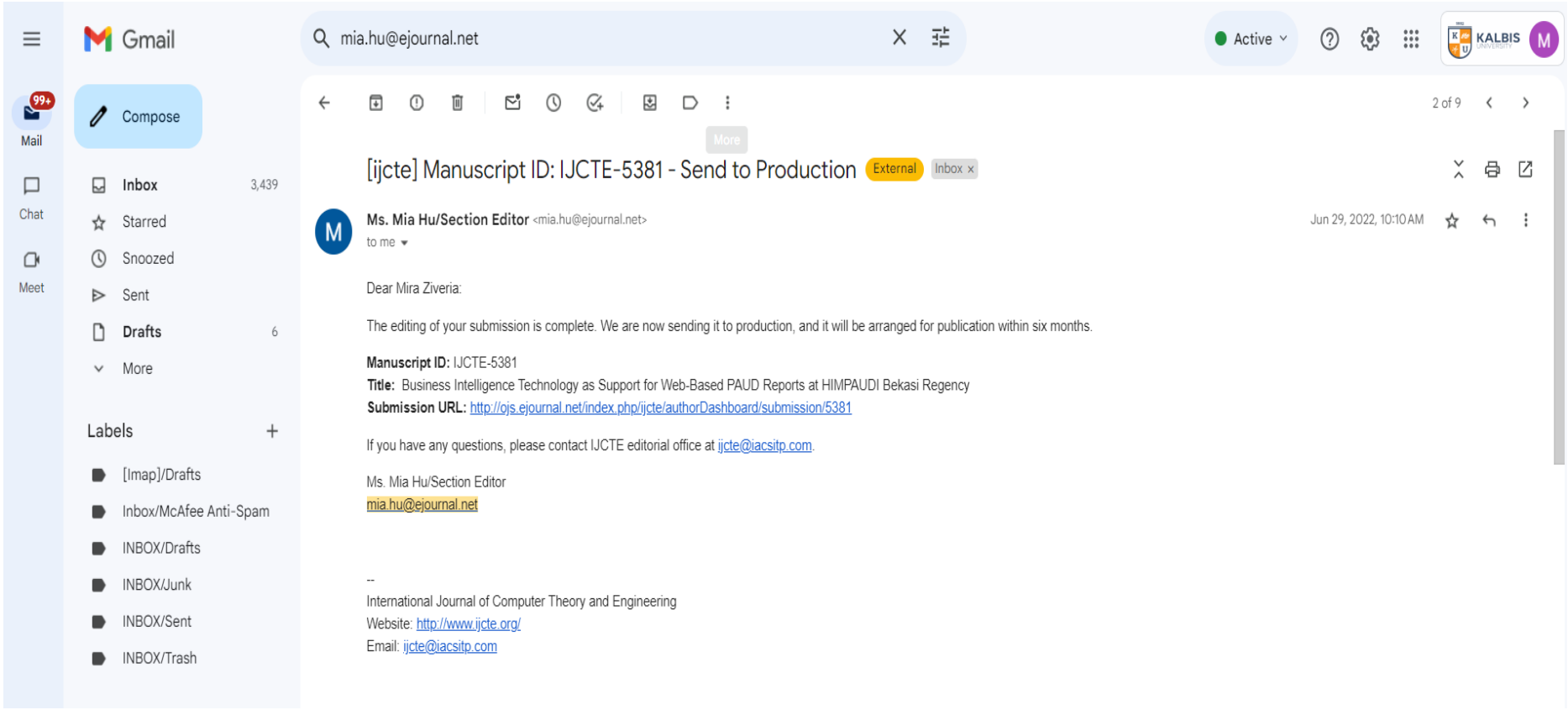
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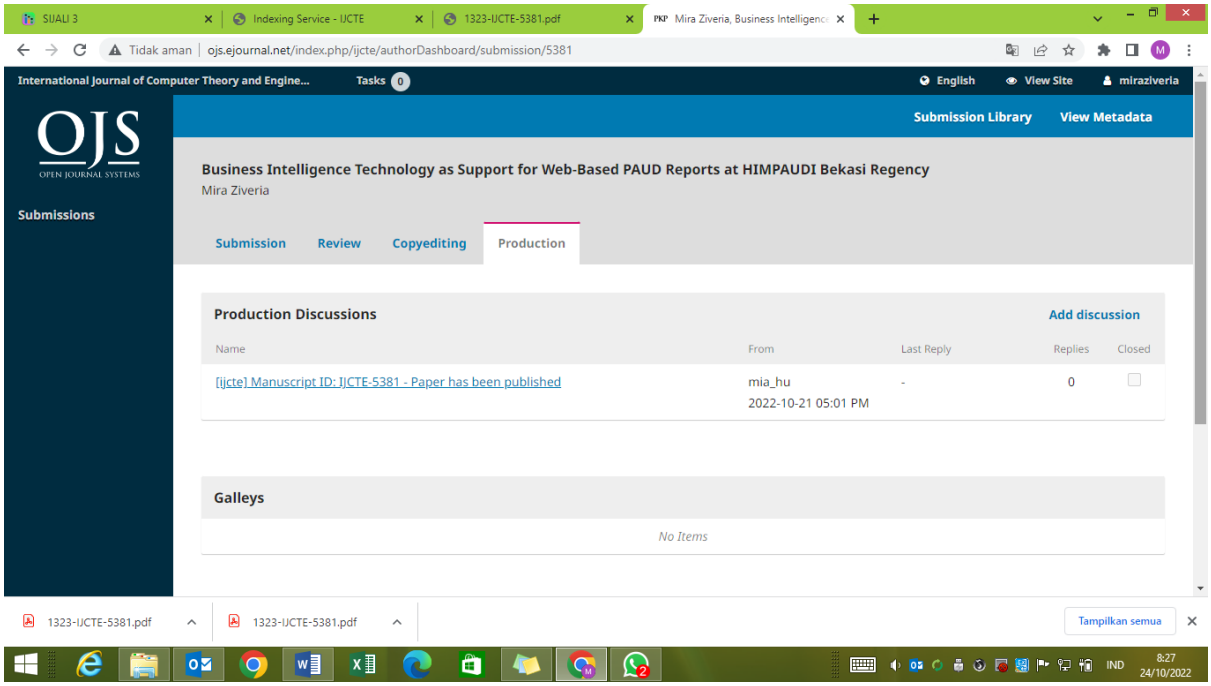

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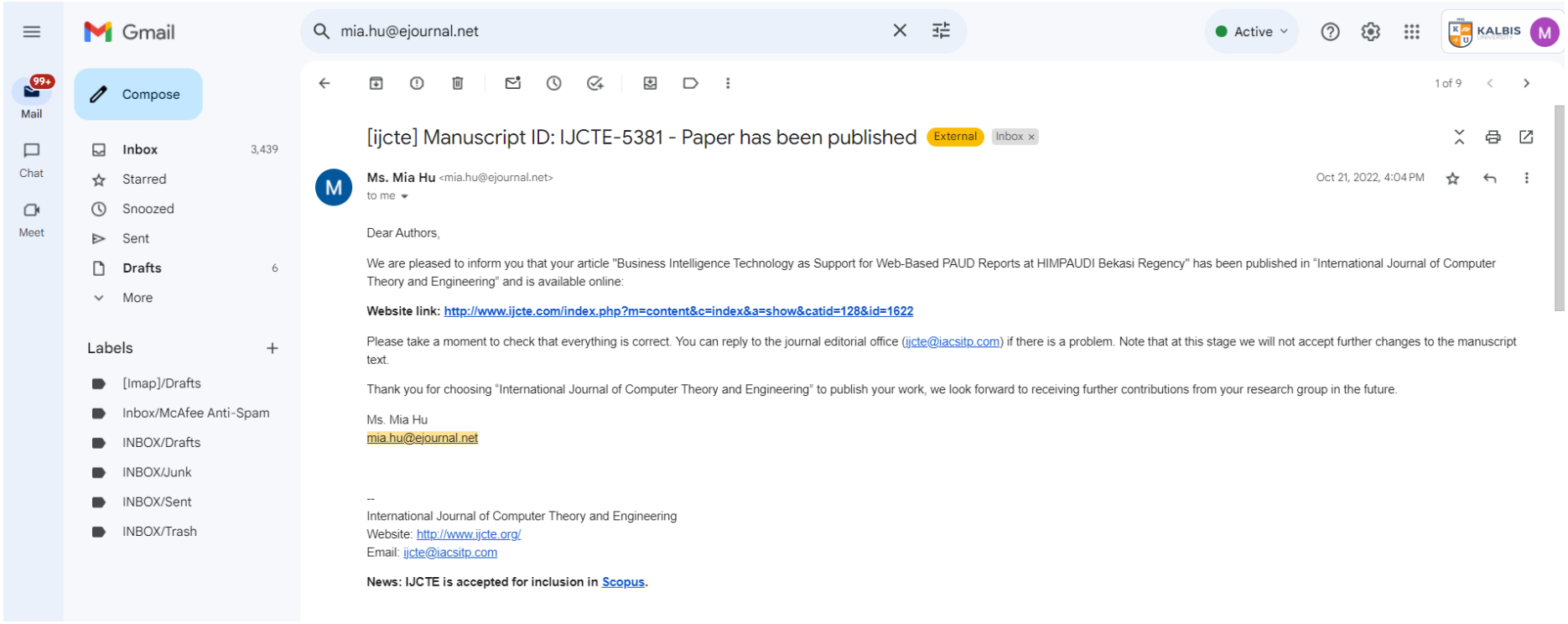
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