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Designing an Online Analytical Processing (OLAP) for Project Feasibility Study in Siau Tagulandang Biaro District

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Abstract:- Based in the Accounts and Accountability Report for the 2018 Regional Revenue and Expenditure Budget, the total budget allocated for the Road and Bridge Construction Program reached Rp.49,475,379,000.00. This large amount of budget requires an analysis of the value of the economic benefits of the project through a public study. In the current initial phase of development planning, feasibility studies of public projects are done to qualitatively analyze the economic benefits instead of quantitatively. Moreover, the data of projects are still processed using Microsoft Excel, making it difficult for the government to analyze due to unavailability of tools that integrate all project information. For this reason, this research was conducted to design a tool for better data analysis in a project feasibility study to present information on the economic benefits of the project for the community, and produce information from various perspectives. This qualitative research was conducted in the form of content descriptive analysis by designing Data Warehouse and OLAP. This research resulted in a tool that can display numerical analysis information and graphical analysis information on the public aspects of the feasibility study.

Keywords:- *Data Warehouse, OLAP.*

I. INTRODUCTION

As stated in the report book on the Accountability of the Regional Government of Kepulauan Siau Tagulandang Biaro District, 2018 is the fifth year of the 2013-2018 Medium-Term Regional Development Plan (RPJMD). There were still various complex regional development problems that arose, one of which was related to the unavailability of proper road infrastructure for Siau island ring road. The Regional Budget of Revenue and Expenditure (APBD) regulated in the Regional Regulations of Siau Tagulandang Biaro District Number 9 of 2017 stated in the budget realization report of the Siau Tagulandang Biaro District showed a total income of Rp.633,363,190,944.00. The total amount of budget realization spent by the Public Works Department of Housing Spatial Planning and Settlement Areas reached Rp.49,475,379,000.00 and was allocated for the road and bridge construction programs. The use of this large budgets should be analyzed in terms of its economic benefits through public studies. The profitability of public sector projects is measured by the economic benefits. Increased regional income is an aspect to be analyzed in the implementation of a public sector project development. Currently, in the initial phase of development planning of Siau Tagulandang Biaro District, qualitative investigation of public sector project has been done to examine the project benefits for the community. However, it has not yet been quantitatively analyzed. In addition, project data were still processed using Microsoft Excel, making it difficult for the government to analyze the data and find information since there were no tools that integrate all development project information. The importance of data integration is stated in the Presidential Regulation Number 95 of 2018 concerning Electronic Based Government Systems (SPBE) in article 1 point 6 that SPBE Architecture is a basic framework that describes the integration of business processes, data and information, SPBE infrastructure, SPBE applications, and SPBE security to produce integrated SPBE services. Thus, an analysis of all aspects and the value of the project's economic benefits should be conducted using an integrated tool for effective and efficient regional budget for development based on the predetermined target.

On-line Analytical Processing (OLAP) is a computer software and database to handle the problems mentioned above since OLAP offers various features including data presentation and supports for perspectives and multidimensional data concepts, data display, and it also responsively collects, manipulates and stores multidimensional data for easier data analysis.

Some research related to this matter have been conducted by Joko Lianto and Ruly Damaratri entitled "Designing OLAP Application for Analysis of Project Feasibility Study: Case Study of Kediri District Government" done to a toll road case study with direct and visible retribution. However, there has not yet been any specific research on public project feasibility that do not directly contribute to regional income. This research analyzed the economic value benefits of the public road project package for the ring road construction in Siau Island. The information generated by OLAP are expected to provide assistance for users, which in this case is the government to analyze the feasibility of the project in terms of economic benefits.

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II. LITERATURE REVIEW

A. Feasibility Study

Feasibility study examines whether a project can be successfully implemented. The term 'success' in this context might be differently interpreted. There are some limited interpretation, yet there are also some other broader interpretations. A more limited interpretation is mainly used by private parties that are more interested in the economic benefits of an investment. Whilst, the government or non-profit institutions use more relative meaning. Some factors can be taken into consideration including the benefits for the wider community in the form of employment, utilization of abundant resources, and so on. It can also be associated with for example, foreign exchange savings or additional foreign exchange needed by the government. (Husnan and Muhammad, 2014)

B. Entreprise Resource Planning (ERP)

Enterprise Resource Planning is a modular software package designed to integrate main processes in an organization which allows a system to serve the needs for information of all division in an organization. ERP application consist of ERP Core Application and Online Analytical Processing (OLAP). ERP Core Application includes two groups namely core application and business analysis application. Whereas, OLAP is an ERP application that provides support in decision making, modeling, ad-hoc reporting / analysis, and what-if capabilities. Data warehouse is the main element in the ERP to provide business analysis. (Hall, 2008).

C. Data Warehouse

According to Bill Inmon, Data Warehouse is defined as a collection of data that has six characteristics that are object oriented, integrated, process oriented, time variant, accessible, and non-volatile. The six characteristics are useful to support the decision making process in an organization by utilizing data, databases, and data warehouses.

Ralph Kimball mentioned that data warehouse is a system for collecting transactional data from various data sources, which prioritizes 2 aspects: query and data analysis. This definition allows the database recognize two terms of data transaction technology and data analysis, namely OLTP (On Line Transactional Processing) and OLAP (On Line Analytical Processing). (Pratama, 2017)

D. On-line Analytical Processing (OLAP)

Alberto Abell'o and Oscar Romero state that OLAP is a computer software (Software) and at the same time acts as an approach in processing the database, in which the data extraction process is carried out from the Data Warehouse or data from the Data Mart to form knowledge.

Diana Elena Codreanu, Denisa Parpandel, and Lonela Popa stated that OLAP is software in the form of an information server, which allows users to make quick access to data and provides computing and calculation processes.

E.F. Codd, S.B. Codd, and C.T. Salley define OLAP as a tool, system, and concept for dynamic data analysis for an enterprise which includes some stages of creating, manipulating, displaying, and formulating data analysis models. To achieve this goal, OLAP offers data aggregation, complex queries, historical data, and storing data into multidimensional data schemes. (Pratama, 2017).

III. METHODOLOGY

This OLAP Project Feasibility Study in Siau Tagulandang Biaro District was conducted based on the results of observations done to the project development planning process in Siau Tagulandang Biaro District. The process of analyzing all project feasibility study data was still conducted using Microsoft Excel, while there has not yet been any feasibility study of the public aspects carried out to examine the benefits of the project for the community and the government. The researcher collected every data and literature related to Data Warehouse, On-line Analysis Processing, Pentaho, and journals related to the topic.

The data collected in this study consisted of primary data and secondary data related to the research topic. The data were then mapped in a context diagram that illustrates OLAP. The flow of the system is described in a flow diagram that explains how the OLAP inputs the data to produce information.

The database of this application was developed using pentaho data integration through the Extract Transformation Loading stage. The next step was processing the cube using SchemaWorkbench to create multi-dimensional data structures to support the data analysis process. OLAP information can be presented using Pentaho BI Server.

A. Data Input

The data used in the design of OLAP Project Feasibility Study in Kepulauan Siau District were a collection of data from project feasibility studies stored in a Comma Separated Values format (CSV).

#	Name	Type	Format	Length	Precision	Currency	Decimal	Group	Trim type
1	Kode Proyek	Integer	#	15	0	$	.	,	none
2	Nama Proyek	String		20		$	.	,	none
3	Klasifikasi Proyek	String		11		$	.	,	none
4	Rencana Pengerjaan	String		5		$	.	,	none
5	Target Proyek	String		6		$	.	,	none
6	Tingkat Kesulitan	String		6		$	.	,	none
7	Tanggal Mulai	Date	MM/dd/yy			$	.	,	none
8	Tanggal Selesai	Date	MM/dd/yyyy			$	.	,	none
9	Kode Anggaran	Integer	#	15	0	$	.	,	none
1..	Nama Paket	String		20		$	.	,	none
1..	Pagu	Number	#,###,###.#	17	2	$	.	,	none
1..	Target	Integer	#	15	0	$	.	,	none
1..	Lebar	Number	#.#	3	1	$	.	,	none
1..	Total Luas	Number	#.#	15	0	$	,	.	both
1..	Kos per m2	Number	#,###,###.#	12	2	$	.	,	none
1..	Penggarukan	Number	#,###,###.#	15	0	$	.	,	both
1..	Tanah dan pengerasan	Number	#.#	15	0	$	,	.	none
1..	Kode SDM	Integer	#	15	0	$	.	,	none
1..	Konsultan Perencana	String		5		$	.	,	none
2..	Kontraktor Pelaksana	String		5		$	.	,	none
2..	Pengawas	String		18		$	.	,	none
2..	Kode Publik	Integer	#	15	0	$	.	,	none
2..	Asumsi Pendapatan Angkutan	Number	#,###,###.#	14	2	$	.	,	both
2..	Asumsi Konsumsi Pribadi	Number	#,###,###.#	10	2	$	.	,	both
2..	Asumsi Pendapatan PBB	Number	#,###,###.#	15	2	$	.	,	both

Help OK Get Fields Preview

Fig 1:- CSV Input (Source : Researcher)

B. Extraction, Transformation, Loading (ETL)

In this ETL process, stagging and the process of making dimensions from technical data, budget data, HR data, and public data were done. The data stagging started from the step select value that selected the intended data. The process was then followed by the step sort rows to sort the data based on certain field. The next step was to save the selection results in the database through the step table output. The data stagging process can be seen in Figure 2. The creation of the dimension table was conducted by reading the source data and then the lookup / update process was carried out through the Dimension lookup / Update step to see data and to perform data update as presented in Figure 3.

Fig 2:- Data Stagging Process (Source : Researcher)

Fig 3:- The Transformation of lookup/update Dimension (Source : Researcher)

C. Fact Table

Fact table in the form of Star Schema multidimensional data modeling contains facts related to project feasibility study data where these data acted as a measure. There are four dimension tables namely dim_sdm, dim_teknis, dim_Budget, and dim_publik.

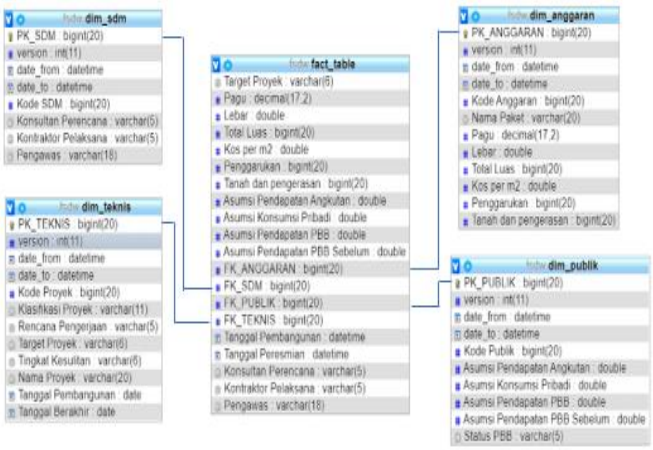

Fig 4:- Fact Table (Source : Researcher)

D. ETL Process

Figure 5 illustrates the Job ETL Process to determine what needs to be done if there are stages that are not running properly, check the destination database, and determine the tasks to be performed in a particular order.

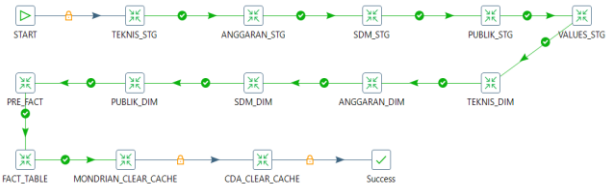

Fig 5:- Job ETL Process of the Feasibility Study (Source : Researcher)

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E. Designing the OLAP Cube

OLAP Cube is the stage in which multi-dimensional data structures were designed to support the data analysis process. Figure 6 shows the schema that was used to form the OLAP Cube. This cube is composed of several dimensions and measurements that are made based on the needs of the project feasibility analysis. The measurements were carried out to find information on the economic feasibility of the project for the community and the government through the Technical, Budget, HR and Public dimensions.

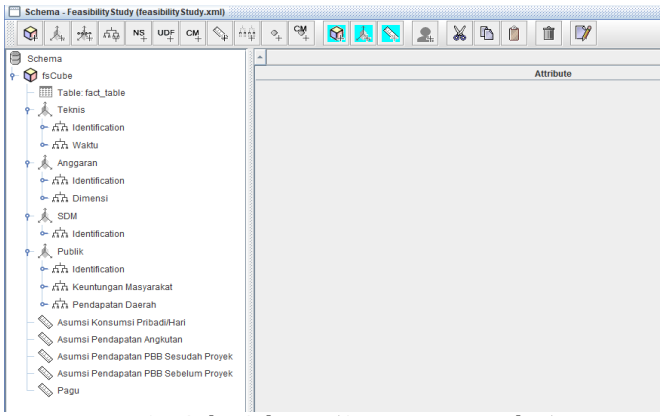


Fig 6:- Cube Schema (Source : Researcher)

F. OLAP Interface

Project feasibility study information will be displayed through Pentaho BI Server with the help of the Saiku plugin. The information display starts from installing a connection from the Pentaho BI Server to the Database that stores ETL and Cube process outcomes. Pentaho BI Server will read OLAP Cube data designed after the schema has been uploaded to the Pentaho BI Server. Information is displayed based on the name of the cubes selected for analysis.

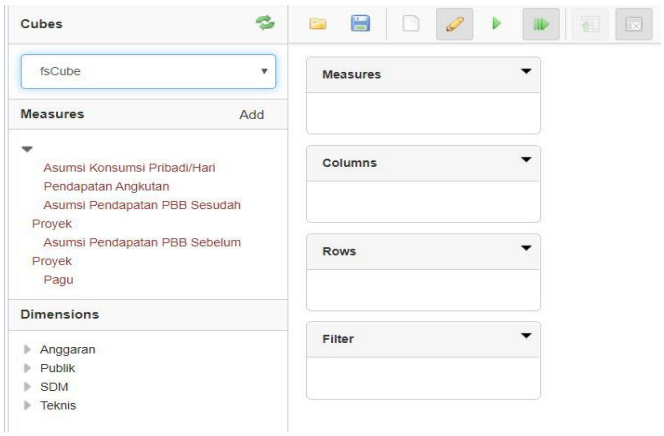


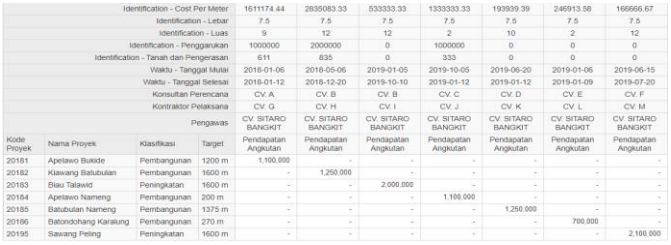
Fig 7:- Cube Analysis Process (Source : Researcher)

IV. RESULT

The analysis is performed based on the numerical and graphics displayed using plugin saiku which had been implemented in the Pentaho BI.

A. The Display of Numerical Data

Numeric analysis on the information of the feasibility study to examine the economic benefits of the projects done in Siau Tagulandang Biaro District was done using some measures including: Assumed Revenue from Transportation, Assumption of Personal / Day Consumption, Assumption of Project Revenue before Property Taxes, Assumption of the Revenue after property taxes and Budget ceilings.

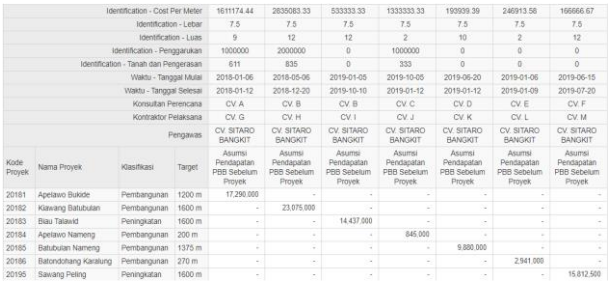


Identification - Cost Per Meter				1611174.44	2835083.33	533333.33	1333333.33	193939.39	246913.58	166666.67
Identification - Lebar				7.5	7.5	7.5	7.5	7.5	7.5	7.5
Identification - Luas				9	12	12	2	10	2	12
Identification - Penggarukan				1000000	2000000	0	1000000	0	0	0
Identification - Tanah dan Pengerasan				611	835	0	333	0	0	0
Waktu - Tanggal Mulai				2018-01-06	2018-05-06	2019-01-05	2019-10-05	2019-06-20	2019-01-06	2019-06-15
Waktu - Tanggal Selesai				2018-01-12	2018-12-20	2019-10-10	2019-01-12	2019-01-12	2019-01-09	2019-07-20
Konsultan Perencana				CV. A	CV. B	CV. B	CV. C	CV. D	CV. E	CV. F
Kontraktor Pelaksana				CV. G	CV. H	CV. I	CV. J	CV. K	CV. L	CV. M
Pengawas				CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT
Kode Proyek	Nama Proyek	Klasifikasi	Target	Pendapatan Angkutan	Pendapatan Angkutan	Pendapatan Angkutan	Pendapatan Angkutan	Pendapatan Angkutan	Pendapatan Angkutan	Pendapatan Angkutan
20181	Apelawo Bukide	Pembangunan	1200 m	1,100,000	-	-	-	-	-	-
20182	Kiawang Batubulan	Pembangunan	1600 m	-	1,250,000	-	-	-	-	-
20183	Biau Talawid	Peningkatan	1600 m	-	-	2,000,000	-	-	-	-
20184	Apelawo Nameng	Pembangunan	200 m	-	-	-	1,100,000	-	-	-
20185	Batubulan Nameng	Pembangunan	1375 m	-	-	-	-	1,250,000	-	-
20186	Batondohang Karalung	Pembangunan	270 m	-	-	-	-	-	700,000	-
20195	Sawang Peling	Peningkatan	1600 m	-	-	-	-	-	-	2,100,000

Fig 8:- Numeric Analysis of Before-Project Property Taxes Measure (Source : Researcher)

Identification - Cost Per Meter				1611174.44	2835083.33	533333.33	1333333.33	193939.39	246913.58	166666.67
Identification - Lebar				7.5	7.5	7.5	7.5	7.5	7.5	7.5
Identification - Luas				9	12	12	2	10	2	12
Identification - Penggarukan				1000000	2000000	0	1000000	0	0	0
Identification - Tanah dan Pengerasan				611	835	0	333	0	0	0
Waktu - Tanggal Mulai				2018-01-06	2018-05-06	2019-01-05	2019-10-05	2019-06-20	2019-01-06	2019-06-15
Waktu - Tanggal Selesai				2018-01-12	2018-12-20	2019-10-10	2019-01-12	2019-01-12	2019-01-09	2019-07-20
Konsultan Perencana				CV. A	CV. B	CV. B	CV. C	CV. D	CV. E	CV. F
Kontraktor Pelaksana				CV. G	CV. H	CV. I	CV. J	CV. K	CV. L	CV. M
Pengawas				CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT
Kode Proyek	Nama Proyek	Klasifikasi	Target	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari	Asumsi Konsumsi Pribadi/Hari
20181	Apelawo Bukide	Pembangunan	1200 m	3,840	-	-	-	-	-	-
20182	Kiawang Batubulan	Pembangunan	1600 m	-	6,400	-	-	-	-	-
20183	Biau Talawid	Peningkatan	1600 m	-	-	3,466	-	-	-	-
20184	Apelawo Nameng	Pembangunan	200 m	-	-	-	3,520	-	-	-
20185	Batubulan Nameng	Pembangunan	1375 m	-	-	-	-	4,480	-	-
20186	Batondohang Karalung	Pembangunan	270 m	-	-	-	-	-	1,600	-
20195	Sawang Peling	Peningkatan	1600 m	-	-	-	-	-	-	3,840

Fig 9:- Numeric Analysis of Personal Consumption Measure (Source : Researcher)

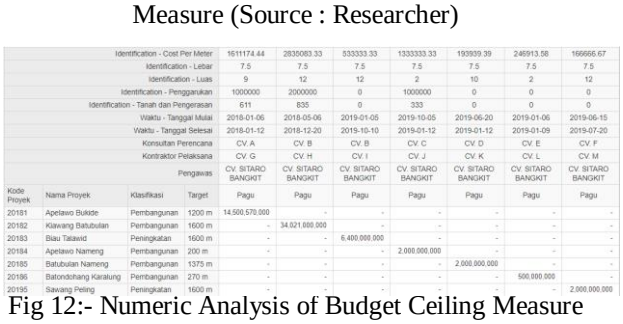


Identification - Cost Per Meter				1611174.44	2835083.33	533333.33	1333333.33	193939.39	246913.58	166666.67
Identification - Lebar				7.5	7.5	7.5	7.5	7.5	7.5	7.5
Identification - Luas				9	12	12	2	10	2	12
Identification - Penggarukan				1000000	2000000	0	1000000	0	0	0
Identification - Tanah dan Pengerasan				611	835	0	333	0	0	0
Waktu - Tanggal Mulai				2018-01-06	2018-05-06	2019-01-05	2019-10-05	2019-06-20	2019-01-06	2019-06-15
Waktu - Tanggal Selesai				2018-01-12	2018-12-20	2019-10-10	2019-01-12	2019-01-12	2019-01-09	2019-07-20
Konsultan Perencana				CV. A	CV. B	CV. B	CV. C	CV. D	CV. E	CV. F
Kontraktor Pelaksana				CV. G	CV. H	CV. I	CV. J	CV. K	CV. L	CV. M
Pengawas				CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT
Kode Proyek	Nama Proyek	Klasifikasi	Target	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek	Asumsi Pendapatan PBB Sebelum Proyek
20181	Apelawo Bukide	Pembangunan	1200 m	17,290,000	-	-	-	-	-	-
20182	Kiawang Batubulan	Pembangunan	1600 m	-	23,075,000	-	-	-	-	-
20183	Biau Talawid	Peningkatan	1600 m	-	-	14,437,000	-	-	-	-
20184	Apelawo Nameng	Pembangunan	200 m	-	-	-	845,000	-	-	-
20185	Batubulan Nameng	Pembangunan	1375 m	-	-	-	-	9,880,000	-	-
20186	Batondohang Karalung	Pembangunan	270 m	-	-	-	-	-	2,941,000	-
20195	Sawang Peling	Peningkatan	1600 m	-	-	-	-	-	-	15,812,500

Fig 10:- Numeric Analysis of Property Taxes before the Project (Source : Researcher)

Identification - Cost Per Meter				1611174.44	2835083.33	533333.33	1333333.33	193939.39	246913.58	166666.67
Identification - Lebar				7.5	7.5	7.5	7.5	7.5	7.5	7.5
Identification - Luas				9	12	12	2	10	2	12
Identification - Penggarukan				1000000	2000000	0	1000000	0	0	0
Identification - Tanah dan Pengerasan				611	835	0	333	0	0	0
Waktu - Tanggal Mulai				2018-01-06	2018-05-06	2019-01-05	2019-10-05	2019-06-20	2019-01-06	2019-06-15
Waktu - Tanggal Selesai				2018-01-12	2018-12-20	2019-10-10	2019-01-12	2019-01-12	2019-01-09	2019-07-20
Konsultan Perencana				CV. A	CV. B	CV. B	CV. C	CV. D	CV. E	CV. F
Kontraktor Pelaksana				CV. G	CV. H	CV. I	CV. J	CV. K	CV. L	CV. M
Pengawas				CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT
Kode Proyek	Nama Proyek	Klasifikasi	Target	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek	Asumsi Pendapatan PBB Sesudah Proyek
20181	Apelawo Bukide	Pembangunan	1200 m	17,888,500	-	-	-	-	-	-
20182	Kiawang Batubulan	Pembangunan	1600 m	-	23,806,500	-	-	-	-	-
20183	Biau Talawid	Peningkatan	1600 m	-	-	14,553,000	-	-	-	-
20184	Apelawo Nameng	Pembangunan	200 m	-	-	-	877,500	-	-	-
20185	Batubulan Nameng	Pembangunan	1375 m	-	-	-	-	10,260,000	-	-
20186	Batondohang Karalung	Pembangunan	270 m	-	-	-	-	-	3,045,000	-
20195	Sawang Peling	Peningkatan	1600 m	-	-	-	-	-	-	15,939,000

Fig 11:- Numeric Analysis of After-Project Property Taxes Measure (Source : Researcher)



Identification - Cost Per Meter				1611174.44	2835083.33	533333.33	1333333.33	193939.39	246913.58	166666.67
Identification - Lebar				7.5	7.5	7.5	7.5	7.5	7.5	7.5
Identification - Luas				9	12	12	2	10	2	12
Identification - Penggarukan				1000000	2000000	0	1000000	0	0	0
Identification - Tanah dan Pengerasan				611	835	0	333	0	0	0
Waktu - Tanggal Mulai				2018-01-06	2018-05-06	2019-01-05	2019-10-05	2019-06-20	2019-01-06	2019-06-15
Waktu - Tanggal Selesai				2018-01-12	2018-12-20	2019-10-10	2019-01-12	2019-01-12	2019-01-09	2019-07-20
Konsultan Perencana				CV. A	CV. B	CV. B	CV. C	CV. D	CV. E	CV. F
Kontraktor Pelaksana				CV. G	CV. H	CV. I	CV. J	CV. K	CV. L	CV. M
Pengawas				CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT	CV. SITARO BANGKIT
Kode Proyek	Nama Proyek	Klasifikasi	Target	Pagu	Pagu	Pagu	Pagu	Pagu	Pagu	Pagu
20181	Apelawo Bukide	Pembangunan	1200 m	14,500,570,000	-	-	-	-	-	-
20182	Kiawang Batubulan	Pembangunan	1600 m	-	34,021,000,000	-	-	-	-	-
20183	Biau Talawid	Peningkatan	1600 m	-	-	6,400,000,000	-	-	-	-
20184	Apelawo Nameng	Pembangunan	200 m	-	-	-	2,000,000,000	-	-	-
20185	Batubulan Nameng	Pembangunan	1375 m	-	-	-	-	2,000,000,000	-	-
20186	Batondohang Karalung	Pembangunan	270 m	-	-	-	-	-	500,000,000	-
20195	Sawang Peling	Peningkatan	1600 m	-	-	-	-	-	-	2,000,000,000

Fig 12:- Numeric Analysis of Budget Ceiling Measure (Source : Researcher)

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B. Graphic Display

Graphic analysis was administered based on several measures: Assumption of Transportation Revenue, Assumption of Personal Daily Consumption, Assumption of Revenue from Property Taxes before the Project, Assumption of Revenue from Property Taxes after the Project and Budget Ceilings.

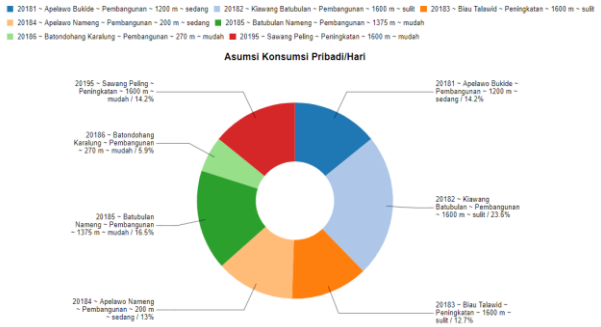

Fig 13:- Graphic Analysis of Personal Consumption Measure (Source : Researcher)

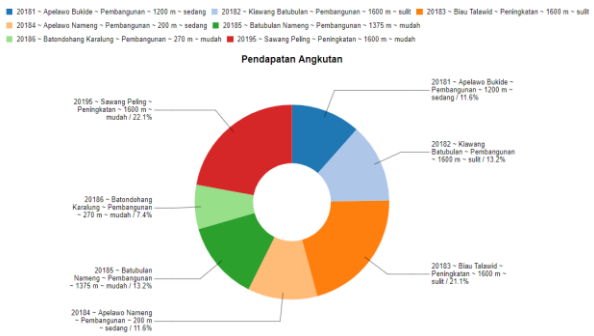

Fig 14:- Graphic Analysis of Assumed Revenue from Transportation (Source : Researcher)

Fig 15:- Graphic Analysis of Revenues from Property Taxes Before and After the Project (Source : Researcher).

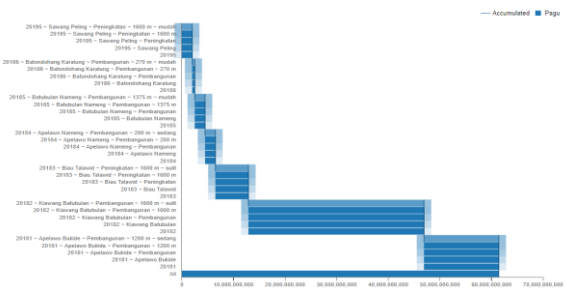

Fig 16:- Graphic Analysis of Budget Ceiling Measure. (Source : Researcher)

Regarding to the results of this study that aimed to design an Online Analysis Processing (OLAP) for Feasibility Study of Projects Done in Kepulauan Siau Tagulandang Biaro District, conclusions were drawn as follows.

1. This study successfully produced a tool in the form of OLAP that can be used for better data analysis on the feasibility of a project.
2. This study provides economic benefits from every project through the public feasibility study for the community.
3. This tool provides information for data analysis of the project from various perspectives which allows every data to be operated in various tabulation forms.

To improve the development of OLAP for Project Feasbility Study in Kepulauan Siau Tagulandang Biaro, suggestions are proposed as follows.

1. The OLAP for project feasibility study can be only accessed by an institution. Thus, future researchers are encouraged to improve this system to be accessible for more than one government institutions.
2. The OLAP for project feasibility study only servers the ring road construction project of Siau Island held by the Department of General Works and Spatial. Hence, this tool is expected to expand the coverage of information about the project feasibility for all work units of the Regional Government of Kepulauan Siau Tagulandang Biaro District.

V. FUTHER STUDIES

The examination of economic benefits of OLAP Project Feasibility Study for the public can be improved by adding more information about the benefits of this project for the employment and investment based on the type of the project.

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REFERENCES

[1]. Akbar, Ricky., Yuliani, Elsha., Mawaddah, Qisty., and Ardhana, Fikri. (2017). “Analisis Data Penjualan Perusahaan Detergen XYZ dengan Aplikasi Zoho Reporting Menggunakan Metode OLAP (Online Analytical Processing)”, Jurnal Edukasi dan Penelitian Informatika (JEPIN), 3(1).

[2]. Badan Pusat Statistik Siau Tagulandang Biaro. (2019). Kabupaten Kepulauan Siau Tagulandang Biaro Dalam Angka 2019. Siau Tagulandan Biaro : Badan Pusat Statistik.

[3]. Dinas Pekerjaan Umum dan Penataan Ruang.(2019). Pagu Anggaran Proyek Bina Marga Kabupaten Kepulauan Siau Tagulandang Biaro. Siau : Dinas PU.

[4]. Dinas Perhubungan Pemerintah Kabupaten Siau Tagulandang Biaro.(2019). Biaya Transportasi Angkutan Pedesaan. Siau : Dishub.
[5]. Hall, James A. (2008). Accounting Information Systems, 4th. Ed. USA : Pre-PressPMG.
[6]. Hanum, Yulhilza. (2017). "Pedoman Penulisan Tesis". Indonesia: Program Pasca Sarjana Universitas Gunadarma.
[7]. Hasibuan, Zainal. (2007). "Metodologi Penelitian Pada Bidang Ilmu Komputer dan Teknologi Informasi'. Indonesia: Fakultas Ilmu Komputer Universitas Indonesia.
[8]. Husnan, Suad. and Muhammad, Suwarsono. (2014). Studi kelayakan Proyek Bisnis. Yogyakarta:Sekolah Tinggi Ilmu Manajemen YKPN.
[9]. Jogiyanto, HM.(2001).Perancangan Sistem Informasi.Yogyakarta:Andi.
[10]. Kumaladewi, Nia. and Sugiarti, Yuni. (2016). "Design analysis of data warehouse for lecturer performance evaluation (Case study: Faculty of science and technology UIN Jakarta)", 4th International Conference on Cyber and IT Service Management.
[11]. Lianto, Joko. and Damaratri, Ruly. (2003). "Pembuatan Aplikasi OLAP Untuk Analisis Studi Kelayakan Proyek: Studi Kasus Pemerintahan Kabupaten Kediri". Jurnal Ilmiah Teknologi Informasi, 2(1).
[12]. Mirabedini, Shirin. and Nourani, Seyedeh Fatemeh. (2014). "The Research on OLAP for Educational Data Analysis", International Research Journal of Applied and Basic Sciences, Vol 8, pp.224-230.
[13]. Mohammed, Razi O. and Talab, Samani A. (2014). "Clinical Data Warehouse Issues and Challenges", International Journal of u-and e-Service, Science and Technology, 7(5), pp.251-262.
[14]. Pemerintah Kabupaten Kepulauan Siau Tagulandang Biaro.(2014).Klasifikasi dan Penetapan Nilai Jual Objek Pajak Bumi dan Bangunan Pedesaan dan Perkotaan. Lembaran Nomor 5 Tahun 2014. Siau : Sekretariat Kabupaten
[15]. Pemerintah Kabupaten Kepulauan Siau Tagulandang Biaro.(2018). Penjabaran Pertanggungjawaban Pelaksanaan Anggaran Pendapatan dan Belanja Daerah Tahun Anggaran 2018. Ondong : Pemkab Sitaro.
[16]. Pemerintah Kabupaten Kepulauan Siau Tagulandang Biaro.(2019). Laporan Keterangan Pertanggungjawaban Pemerintah Daerah Tahun 2018. Ondong : Pemkab Sitaro.
[17]. Peraturan Presiden Nomor 95 Tahun 2018 Sistem Pemerintahan Berbasis Elektronik. Jakarta.
[18]. Permana, Kadek Ary Budi., Wulandari, Dewa Ayu Putri., and Mertasana, Putu Arya.(2018). "Online Analytical Processing (OLAP) for Disaster Report", International Journal of Engineering and Emerging Technology", 3(1).
[19]. Poenaru, Cristina Elena., Merezeanu, Daniel., Dobrescu, Radu,. and Posdarasc, Eugenie. (2017). "Advanced Solutions for Medical Information Storing: Clinical Data Warehouse", The 6th IEEE International Conference on E-Health and Bioengineering.
[20]. Pratama, I Putu Agus Eka. (2017). Handbook Data Warehouse. Bandung : Informatika
[21]. Subuh, Darmawan. and Yasman, Wita. (2019). "Implementasi Data Warehouse Dan Penerapannya Pada Toko Magnifique Clothes Dengan Menggunakan Tools Pentaho", Seminar Nasional Inovasi dan Aplikasi Teknologi di Industri.
[22]. Supriyatna, Adi. (2018). "Sistem Analisis Data Mahasiswa Menggunakan Aplikasi Online Analytical Processing (Olap) Data Warehouse", Jurnal Pilar Nusa Mandiri, 8(1).
[23]. Sutojo, Siswanto. (2013). Studi Kelayakan Proyek (Edisi 5). Jakarta : PT.Damar Mulia Pustaka.
[24]. Tohir, Arik Sofan. and Kusrini, Kusrini.(2017). "On-Line Analytic Processing (OLAP) Modeling For Graduation Data Presentation", 2nd International Conferences on Information Technology, Information Systems and Electrical Engineering (ICITISEE).
[25]. Witjaksono, R. Wahjoe., Wiyogo, Mardiyanto., and Wicaksono, Prima Nanda. (2015). "Perancangan Aplikasi Business Intelligence Pada Sistem Informasi Distribusi PT Pertamina Lubricant Menggunakan Pentaho". Jurnal Rekayasa Sistem & Industri, 2(2).